

## American Economic Association

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Source: *The Journal of Economic Perspectives*, Vol. 3, No. 2 (Spring, 1989), pp. 3-16

Published by: [American Economic Association](#)

Stable URL: <http://www.jstor.org/stable/1942665>

Accessed: 19/01/2011 18:09

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# Distinguished Lecture on Economics in Government: Central Banking and Systemic Risks in Capital Markets

Andrew F. Brimmer

**O**n several occasions since 1970, the Federal Reserve has intervened to help prevent or delay the failure of a large individual commercial bank. It has typically not played a similar role with respect to smaller banks. Moreover, in three instances, the Federal Reserve has intervened to rescue capital market institutions other than banks.

These actions have been criticized as inconsistent with the responsibilities of a central bank, which have traditionally been defined to include the maintenance of the monetary base (gold, currency, or bank reserves) and control over the growth rate of the money supply. The central bank has also been perceived as the ultimate source of liquidity for the financial system as a whole. Thus, in time of financial crises, the central bank was to be the “lender of last resort.” It should lend generously to other banks faced with a sudden public demand for liquidity although it should provide funds at a penalty interest rate.

This traditional view of the central bank’s last resort lending function is primarily the product of 19th century thinking in Great Britain. The term “lender of last resort” was apparently first used by Sir Francis Baring (1797) when he referred to the Bank of England as the “dernier resort,” the source of liquidity for all banks in a period of crises. The first full treatment of the idea was provided by Henry Thornton in testimony before Parliament and in public speeches, but his comprehensive exposition of the last resort lending function appeared in 1802. However, when the subject arises among economists, the name that comes to mind most readily is that of Walter Bagehot. His definitive analysis and recommendations were presented in 1873 in *Lombard Street*.

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Bagehot, as did Thornton before him, stressed the Bank of England's role as the holder of the country's gold reserve, which in his day was the ultimate foundation of the money supply. Consequently, the Bank should be prepared to lend freely if the demand for cash increased dramatically. If faced with an external drain of specie, the Bank should raise its own lending rate sharply to induce domestically-held gold to remain at home and to attract gold from abroad. In response to a suddenly strong domestic demand for liquidity, the Bank should issue new bank notes and lend to domestic borrowers as required. But, to reduce "moral hazard" (that is, assuming the burden of bad loans made by incompetent private lenders), such accommodation should be temporary, and the credit should be extended at a penalty interest rate.

Thus, Bagehot identified the last resort lending function with the central bank's macroeconomic role, which focused on the protection of the monetary base to assure the availability of funds for the financial system as a whole. It had to be market oriented and not concerned with the survival of a private institution. Although an individual commercial bank could borrow from the central bank, it was perceived as a conduit to channel liquidity to the public; it was not seen as the beneficiary of aid to prevent its own failure.

With varying degrees of amplification by scholars who followed, Bagehot's conception of the last resort lending function is shared by most economists today, especially by monetarists.<sup>1</sup> Translated into contemporary central banking practices in the United States, it implies that the Federal Reserve System must be prepared to assure the liquidity of the economy at large. It should seek to control the growth rate of the monetary base to achieve macroeconomic objectives (particularly the eradication of inflationary pressures), and it should abstain from efforts to rescue individual banks. In pursuit of this policy goal, open market operations rather than the discount window should be the preferred instrument.

In general, the Federal Reserve subscribes to and seeks to carry out the prescription described above. However, on several occasions, it has also digressed from its overall strategy of monetary control to undertake a tactical rescue of individual banks and segments of the capital market. It has defended its actions on the ground that the actual failure of the distressed institutions would have posed unacceptable systemic risks, meaning that the adverse effects probably would have spread and severely damaged the financial fabric of the country at large.

The three commercial bank episodes in which the Federal Reserve intervened included Franklin National (1974),<sup>2</sup> SeaFirst (1984), and Continental Illinois (1984). Each of these banks was part of a highly developed network of banking relationships which constitute the domestic and international money markets. The threads which link the participants are large, highly interest-sensitive, short-term deposits and other

<sup>1</sup>The evolution of economists' thought on the central bank as lender of last resort is treated comprehensively by Humphrey and Keleher (1984).

<sup>2</sup>I have discussed the Franklin National episode more fully elsewhere, in Brimmer (1976a, b).

balances. For the banks, these are key sources of liquidity; for those who supply the funds, they represent a major part of their short-term earning assets.

But on three other occasions, the Federal Reserve intervened to counter systemic risks to the financial system beyond the arena of commercial banks. The events which prompted these actions were the threat to the commercial paper market triggered by the bankruptcy of the Penn Central Railroad in June 1970, the pressures on broker-dealer firms generated by the collapse of speculation in silver in early 1980, and the near failure of the clearing and settlement systems operated by stock and commodity exchanges which occurred during the stock market crash of 1987.

I was a Member of the Board of Governors of the Federal Reserve System during the Penn Central episode, and I shared in the decisions to intervene. As a Public Governor of the Commodity Exchange, I helped to formulate the policies applied during the silver speculation and in the aftermath of the stock market collapse. The discussion which follows draws on those experiences.

## **Penn Central Bankruptcy and the Commercial Paper Market**

In May 1970, senior officials of Penn Central Railroad told Nixon Administration officials that the railroad was on the verge of bankruptcy and would not be able to meet its obligations unless it received Federal Government assistance. The company sought to justify its appeal on the grounds that it was performing vital national defense transportation services, and its bankruptcy would disrupt the defense effort.

The Administration expressed sympathy for Penn Central's plight and asked Congress to pass enabling legislation to provide financial assistance on an emergency basis. The Federal Reserve supported that recommendation. But after six weeks of debate, Congress declined to adopt the measure.

In the meantime, the Nixon Administration asked the Federal Reserve Board to authorize the Federal Reserve Bank of New York to lend directly to Penn Central. The request was made under that provision of the Federal Reserve Act which allows Federal Reserve Banks (upon an affirmative vote of at least five members of the Federal Reserve Board) to make loans to individuals, partnerships, or corporations for short periods of time if the latter cannot get sufficient credit from commercial banks. But to qualify, borrowers must be creditworthy, and the loans must be secured by collateral acceptable to the Reserve Bank.

Upon receipt of the request, the Federal Reserve Board instructed the Federal Reserve Bank of New York (FRBNY), augmented by staff experts from the Federal Reserve Bank of Philadelphia, to appraise Penn Central's creditworthiness. On Thursday, June 18, the FRBNY told the Federal Reserve Board that Penn Central probably would not be able to repay any credit that might be extended. After thorough discussion, the staff's recommendation that the loan not be granted was accepted.

On Friday, June 19, the Federal Reserve Board told officials in the U.S. Treasury that Penn Central would not be permitted to borrow from the FRBNY. So on Sunday, June 21, that railroad went into federal court to seek a receivership.

In the meantime, the Federal Reserve Board knew by mid-afternoon on Friday, June 19, that Penn Central would be declared bankrupt over the weekend. The Board anticipated that the announcement would have a seriously adverse effect on the money market, particularly on the commercial paper segment. Penn Central had a sizeable volume of commercial paper outstanding with very short maturities, and bankruptcy would mean an immediate default on its commercial paper obligations. Such an event was expected to have a chilling effect on the commercial paper market, and issuers would find it difficult to roll over their maturing obligations.

The Federal Reserve Board anticipated that many commercial and industrial firms which had previously relied on sales of commercial paper to raise funds would have to revert to commercial banks for accommodation. Due to the monetary restraint which the Federal Open Market Committee (FOMC) was then pursuing, most money center banks had no excess reserves. However, the member banks were invited to borrow from their district Federal Reserve Banks. Over June 20–21, an official of the FRBNY called a number of large money market banks to alert them to the nature of the situation they would probably face on Monday. They were told that they should be prepared to meet the credit needs of their customers, and that they could obtain from their Federal Reserve Bank the reserves required to support the related expansion in deposits. However, commercial banks were also told that, while Federal Reserve Banks would provide liquidity, they would have to take the credit risk involved in lending to their business borrowers.

As the Penn Central episode was unfolding, Regulation Q ceilings on interest rates paid on time and savings deposits were forcing funds into higher yielding money market investments. The expected rise in short term interest rates would aggravate the problem. Consequently, the Federal Reserve Board voted to suspend immediately the ceilings on all deposits of \$100,000 and over. This agreement was reached on Monday, June 22, but the formal vote was delayed until the next day to permit the Federal Deposit Insurance Corporation (FDIC) and the Federal Home Loan Bank Board to take parallel action.

It so happened that a regular meeting of the FOMC was already scheduled for Tuesday, June 23rd, and the Reserve Bank presidents were already in town. Before the FOMC meeting began, the presidents were briefed on the recent actions, and they were asked to contact commercial bankers in their respective districts. In the FOMC meeting which followed, the Board's liberalizing moves were accepted.

A number of commercial banks did borrow from Federal Reserve Banks under the special dispensation. The maximum amount outstanding was around \$575 million reached in mid-July. By the end of September, the extra borrowing from Federal Reserve Banks had been repaid.

In summary, as a by-product of the Penn Central bankruptcy, the commercial paper segment of the capital market was severely buffeted. To assure continued

liquidity, the Federal Reserve Board stepped in to assure that an important sector of the capital market would continue to function.

## **Brokers and Dealers and Speculation in Silver**

In March 1980, a number of brokers and dealers in securities and commodities suddenly found themselves on the edge of bankruptcy. They were carried there in the backwash of the intense speculation in silver that occurred in late 1979 and early 1980. If they had failed, several major money center banks also would have suffered serious loan losses, and the financial markets generally would have been seriously disrupted.

Vigorous speculation in silver futures began in September 1979. At that time, members of the Hunt family of Texas (Bunker, Herbert, and Lamar) decided to expand their already sizeable holdings of silver bullion. Consequently, they began to buy silver in both the spot (or cash) market and also to take long positions in silver futures contracts on the Commodity Exchange (COMEX) in New York City. However, contrary to normal practice in futures markets, the Hunts stood for delivery of the physical commodity when the contracts matured instead of settling their claims in cash. Upon taking possession of bullion, the Hunts not only moved it from exchange warehouses but actually shipped a significant part of their stock to vaults in Switzerland. This behavior created a progressive shortage of silver for industrial uses.

The strong speculative demand for silver exerted sharp upward pressure on prices. For example, in the week of August 3, 1979, cash prices for silver averaged \$8.95 per ounce. On COMEX in the same week, the maturing futures contract price averaged \$8.87. But pressures on prices mounted steadily and lifted the cash quotation to \$18.77 and the futures price to \$18.81 in the week ended November 30. By the end of the year, the spot price for silver was recorded at \$28.00 per ounce, and the maturing COMEX contract traded at \$29.35. Then, in less than three weeks, silver prices jumped by nearly three-quarters. On January 17, 1980, the spot price peaked at \$50.42, and the COMEX contract traded at an average of \$46.80 in the same week.

Paralleling and partly driving the sharp rise in prices was a progressive concentration of silver (both physical materials and futures contracts) in the hands of a few speculators among whom the Hunts and their associates were the most active. For instance, in the week ended August 3, 1979, the open interest (the number of outstanding contracts of 5,000 ounces each) on COMEX was reported at 4244 contracts of which 28 percent were held by the four largest holders. By the week of October 26, the open interest had jumped to 8998 contracts, and the four primary speculators held 54 percent of the total.

The greatest degree of concentration of ownership in the silver market occurred during the week of January 11, 1980. In that period, open interest on COMEX stood at 18,577 contracts, and the four long holders (mainly the Hunts) accounted for 69.1

percent of them. This figure translated into 64.2 million ounces of silver with a market value of \$2.5 billion.

In reaction to this situation, the COMEX Board of Governors established a Special Silver Committee, and I was named its Chairman. The Committee's main assignment was to devise and implement means to reduce the extraordinary degree of concentration and to assure that the silver contracts would liquidate in an orderly manner. In pursuit of these objectives, the Committee relied mainly on negotiations and moral suasion (principally with brokers and dealers who handled orders for customers but sometimes with the speculators themselves). The Committee mainly urged holders to roll their positions forward into distant contract months rather than stand to receive bullion upon the maturity of the contracts. The Committee was moderately successful in this effort.

However, in view of the persistence of a high degree of concentration in contracts maturing in the nearby months, on January 7, 1980, the COMEX Board of Governors (rather than the Special Silver Committee) imposed position limits on the beneficial ownership of silver futures contracts. While the volume of outstanding contracts declined slightly over the next few weeks, the degree of concentration actually increased. Consequently, on January 21, 1980, the COMEX Board voted that trading in all silver futures contracts be permitted for liquidation only. No new position could be acquired except by short sellers whose primary purpose was to effect delivery of silver upon maturity of their contracts. The liquidation-only order was lifted in February 1980.

By these measures, COMEX pricked the bubble of silver speculation. Prices decreased noticeably, from an average of \$46.80 in the week of January 18 to \$34.15 by the end of that month. More silver bullion began to show up in COMEX warehouses.

Prices then stabilized somewhat and remained in the range of \$32.90 to \$37.10 during the week of March 7. But in the middle of that month, speculators began to be squeezed by falling silver prices and the need to post maintenance margins against their outstanding contracts, since many of the contracts had been financed by loans from broker-dealers or from commercial banks. As a general practice, most COMEX member firms lent their customers no more than 75 percent of the market value of a contract, which was determined at the close of business each day using the final price set on COMEX. Thus, as the price of silver declined, calls increasingly went out requiring contract holders to post more maintenance margin.

From mid-March, an expanding number of speculators found it increasingly difficult to meet the margin requirements. Following the usual practice in the industry, most speculators had withdrawn the cash thrown off as the market value of silver contracts had risen day-by-day. Some of them (including the Hunts) used the cash to buy more silver. Thus, when the price-margin scissors began to cut, many speculators could get new cash only by borrowing from broker-dealers, from banks, or by selling in the open market the silver they held.

In addition, a number of broker-dealers themselves were hard pressed by declining prices. Under the rules of New York Stock Exchange (NYSE), member firms

(some of whom also hold membership on COMEX) are subject to strict capital requirements. In 1980, the minimum capital ratio was 4 percent of the amount outstanding in their customers' accounts. The rules also required that the firms charge against their capital any uncovered losses suffered in the disposition of customers' contracts liquidated to satisfy margin call.

This is exactly the situation in which the Hunts and their broker-dealers found themselves as the silver speculation wound-down in early 1980. The Hunts' primary silver broker was Bache Metals, a subsidiary of the Bache Group, which also included Bache Halsey Stuart, a leading broker-dealer in securities. As of March 14, 1980, the Hunts' silver futures contracts outstanding on the books at Bache were worth \$480 million valued at the price in the spot market. On that day, the accounts were carrying \$429 million of unrealized losses. The Hunts had \$233 million in loans from Bache Halsey, and 2,992 warehouse receipts had been posted as collateral. The Hunts' account at Bache Halsey was also in deficit by \$108 million.

Reflecting these developments, on March 17, the senior management at the Bache group asked the Hunts to put up an additional \$44 million in maintenance margin. The Hunts could not meet the call within the regular time allowed. Consequently, they were in actual default on their contracts. However, rather than liquidate the Hunts' silver to satisfy the call (which would have been the usual step), Bache extended loans to the Hunts. The broker-dealer firm, in turn, obtained loans from banks and used the proceeds to enable the Hunts to hold on to their silver.

Another margin call of \$100 million went out to the Hunts on March 25. The Hunts could not meet this call, so Bache began to liquidate the Hunts' silver to raise cash. These sales contributed to a further sharp decline in prices. For example, in the week ended March 21, the COMEX silver price averaged \$22.50. On March 26, the contract price was quoted at \$15.80. But the next day, Thursday March 27, additional margin calls were made. For the Hunts, the new calls made by Bache exceeded \$100 million, and they could not be met. The liquidation of contracts continued. Along with it, the COMEX price dropped by \$5.00 to \$10.80 in one day.

As selling pressures developed and silver prices plummeted, rumors spread through the financial markets asserting that the Hunts were in a serious financial bind and that they were about to drag Bache into bankruptcy. Other brokerage firms were also said to be facing difficulties. The uncertainty had a chilling effect in the marketplace, and many investors sold securities and switched their funds into U.S. government issues. Reflecting this rush to safe havens, the Dow Jones industrial average of stock prices dropped by 25 points within a few hours (although the average did close up  $2\frac{1}{2}$  points for the day as a whole.)

On March 28, the Hunts defaulted on a commitment arranged in January 1980, to purchase 28.5 million ounces of silver at approximately \$36.00 per ounce from Philipp Brothers, which was a subsidiary of Englehart Minerals & Chemicals Company. Another delivery of 12.0 million ounces valued at \$434 million was set for March 31, 1980. When the Hunts told Englehart a few days ahead of time that they would not be able to receive and pay for the silver, the Hunts faced the prospect of what could have turned out to be the largest default by a single group of commodity



speculators ever recorded in the U.S. market. That prospect was one of the threats to the nation's financial fabric with which the Federal Reserve and a group of money center banks had to wrestle over the last weekend in March.

As of March 27, 1980, the Hunts' largest loan (\$236 million) was provided by Bache. Merrill Lynch had lent \$169 million; ACLI International had lent \$134 million; E. F. Hutton had lent \$100 million, and Mocatta Metals had lent \$26 million. Nine commercial banks had provided the Hunts \$614 million with which to acquire silver. In total, the Hunts' silver-related loans totaled \$1.4 billion on March 27, 1980. The Hunts' leading broker-dealer (Bache Halsey) in turn raised funds from commercial banks which were used to finance their silver holdings. The bank loans were secured by Hunt silver warehouse receipts. If the Hunts had ultimately defaulted on their commitments to the point where they could not have repaid Bache Metals, the bank loans in turn would have been written off. These losses would have had an adverse impact on the banks which had extended the credit.

As mentioned above, the deterioration in the Hunts' account at Bache Halsey put extreme pressure on that firm's capital position. For example, as of March 14, 1980, Bache Halsey's minimum net capital requirement under NYSE rules was \$37.7 million. But if the Hunts' large silver account had been valued and liquidated at spot prices and the resulting loss charged against Bache Halsey's capital, the latter would have been in deficit by \$107 million. However, since the account was valued on the basis of futures prices (in keeping with industry practice), the Bache Halsey minimum capital was recorded at \$130 million. Finally, on March 27, a spot price valuation of the account would have left Bache Halsey's capital in deficit by \$64.5 million. Under NYSE rules, Bache would not have been able to take on any new business. For all practical purposes, it would have been thrown into bankruptcy.

Driven by these extreme pressures on its capital position, on March 26–27, 1980, senior executives of the Bache Group sought to persuade COMEX officials to close the exchange and allow trading of futures contracts for liquidation only. They were turned down. They then appealed to the U.S. Commodity Futures Trading Commission (CFTC) which has oversight of COMEX as well as of other commodities exchanges. The Bache Group officials also tried to persuade the U.S. Treasury and the Federal Reserve Board to close the market. After much discussion (in some of which I participated with Federal Reserve and Treasury officials), the decision was made early on the morning of March 28 not to close the commodities market.

This was a wise decision. If U.S. markets had been closed, silver trading would have continued in London. Thus, the world price of silver probably would have continued to drop. This would have generated additional large margin calls in the United States. Since many speculators could not have raised cash quickly to cover the shortfall, many broker-dealer firms would have seen their capital erode rapidly. Consequently, a number of those firms would have been thrown into bankruptcy.

The quest for a solution to the Hunts' financial difficulties ended in Boca Raton, Florida, where a meeting of the Reserve City Bankers Association was taking place. The Chairman of the Federal Reserve Board was also in attendance. During negotiation, in which the Federal Reserve Chairman played a key role, it was agreed that a

consortium of banks would lend the Hunts \$1.1 billion to be secured by the pledge of a major portion of the Hunts' holding of silver bullion. The proceeds were used by the Hunts to repay the silver-related debt described above.

The Federal Reserve Board Chairman approved the arrangement, although it conflicted with the Federal Reserve's guidelines which discouraged bank lending to borrowers to enable the latter to engage in speculative activity. The Federal Reserve has defended the decision to permit this breach in its credit restraint program by citing the threat to the overall financial system if the transaction had been blocked. In its judgment, a repudiation by the Hunts of their silver-related indebtedness would have dragged down a number of broker-dealers and would have erased a significant amount of bank capital. Market prices of silver and of publicly-traded securities as well might have collapsed. The Federal Reserve concluded that such a risk to the financial system had to be prevented.

## **Federal Reserve Intervention Following the Stock Market Crash of 1987**

The stock market crash on October 19, 1987, wiped out almost \$1 trillion of financial wealth in the United States. While this dramatic decline captured the headlines, a far more serious threat to the financial system was occurring because of the near-failure of the clearing and settlement system that underpins stock and commodity markets.

In the United States, the market value of common stocks reached a peak on August 25, 1987. On that day, the Dow Jones Industrial Average of 30 common stock prices (the most widely followed measure of market values) closed at 2722.42. Between August 25 and October 14, 1987, the DJIA declined to 2412.70, a decrease of 11.4 percent. Over the next two days, a further decline of 6.9 percent brought the index to 2246.73 on October 16. Thus, a net erosion of 17.5 percent in the DJIA had already taken place prior to the market crash.

On Monday, October 19, a record 604.3 million shares were traded on the NYSE. The DJIA fell by 508 points and closed out at 1728.42. If the declines of October 16 and 19 are taken together, the two-day drop exceeded the two-day decline registered on October 28 and 29, 1929.

Many factors contributed to the original erosion and eventual collapse of stock prices in the fall of 1987: growing expectations of renewed inflation, the depreciation of the U.S. dollar, rising interest rates that made bond yields more competitive with common stocks, a fading of foreign investors' confidence, growing pessimism about near-term profitability for U.S. corporations, the unwillingness of Japan and Germany to stimulate their economies, concern over federal budget deficits, and a number of other developments. The result was a major attempt to sell stocks and take profits before prices fell further. Moreover, reinforced by a variety of computer-linked stock trading strategies, decisions to sell led to an avalanche of more selling.

The most serious risk to the overall financial system posed by the stock market crash arose not from the sharp decline in prices but from the strains which were put on the system for clearing and settling securities and commodity futures transactions. Under ordinary circumstances, the clearing and settlement systems (CSS) operated by stock and commodity exchanges are hidden away in back offices. They normally facilitate the exchange of financial instruments for cash between sellers and buyers according to predetermined time schedules. The CSS relied on by each stock or commodity exchange evolved over many years to handle the requirements of each specific marketplace. However, because of innovations which have produced new types of financial instruments, the stock and commodities markets have come to overlap, and respective CSS's now impinge upon each other.

The most striking example of this financial integration is presented by Standard & Poor's 500-stock index futures contract (S&P-SIF) traded on the Chicago Mercantile Exchange (CME). The S&P-SIF was at the heart of the clearing and settlement crisis on October 20, 1987. The heavy volume of transactions in the 500 S&P stocks listed on the New York Stock Exchange (NYSE) triggered a correspondingly large volume of arbitrage transactions in the S&P-SIF traded on the CME. The enormous volume of sell orders in the face of shrinking demand led to accelerating declines in prices of both common stocks and index futures contracts. These price declines precipitated increasingly large margin calls on both the NYSE and CME.

It will be recalled that a futures contract, executed on a commodities exchange, is an agreement to buy or sell stated quantities of a designated commodity on a specific date in the future. Historically, futures contracts were used to enable producers of agricultural commodities (such as beef, corn, pork, soybeans, and wheat) and metals (such as copper, gold, and silver) to discover prices and to shift the risks of future price changes to speculators and other investors who were willing to assume such risks on the expectation of profiting from buying cheaply and selling dearly. Futures contracts were traded on commodity exchanges by brokers and speculators who specialized in these markets. In contrast, listed common stocks were traded on stock exchanges by brokers and dealers who specialized in securities.

But the creation of stock index futures contracts in the 1980s linked the stock and commodities markets. With this integration, large institutional investors could hedge their portfolios of common stocks listed on the NYSE by buying or selling stock index futures contracts listed on the CME. A new cadre of brokers emerged to handle the business.

While futures contracts are traded on commodities exchanges, the clearing and settlement function (essentially matching buy and sell orders) is carried out by an affiliated clearinghouse whose membership is made up of brokerage firms who trade the contract. The clearinghouse may also rely on a settlement bank to administer margin calls. The rules governing margin requirements differ substantially between stock and commodity markets. In the case of stocks, the Federal Reserve Board and stock exchanges set the margin which is the percentage of the market value of securities that a customer can purchase with the use of credit. The Reserve Board's Regulation T governs margin lending by brokers, and its Regulation U governs securities credit extensions by banks. Since January 3, 1974, the Federal Reserve

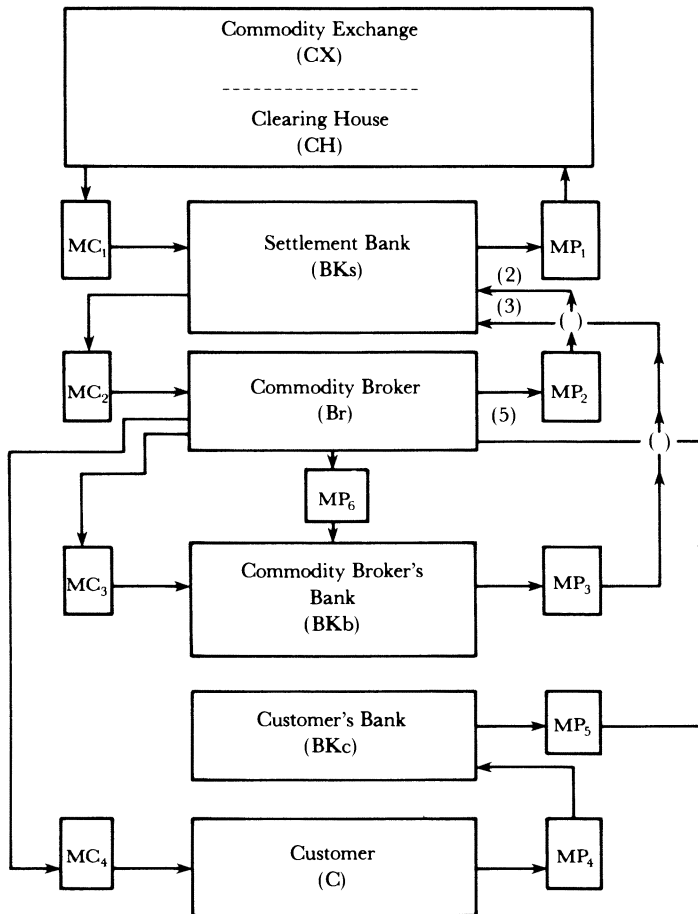


Fig. 1. Stock index futures contract margin call flow of funds

Source: Prepared by Brimmer & Company, Inc.

Board has set margin requirements at 50 percent. The NYSE has typically set margin requirements for member firms in line with those established by the Federal Reserve. The Federal Reserve margin requirements are designed to limit the use of credit to purchase or carry securities. In contrast, in commodities markets, margins set by the commodities exchanges are really “earnest money” given by the buyer to the seller to assure that the terms of the futures contract will be carried out. On October 16, 1987 (the last trading day preceding the stock market crash), the CME had in place an initial margin of \$10,000 per contract on the S&P-SIF.

Within these rules, a decrease in the price of the S&P stock index futures would trigger the following chain of margin calls and settlements, which are illustrated in Figure 1.

First, the clearinghouse, at the close of business, would notify the settlement bank that certain customers’ accounts at the clearinghouse were now in deficit, and

additional deposits (margin) were required by 7:00 a.m. the following morning. ( $MC_1$ )

Second, the settlement bank makes margin payment ( $MP_1$ ) to the clearinghouse on behalf of the bank's commodity broker customer. Thus, the settlement bank has extended credit to the commodity broker.

Third, the settlement bank informs the commodity broker of the shortfall in customers' accounts and of the payment made to the clearinghouse on their behalf. The settlement bank instructs the commodity broker to deposit funds in their customers' accounts. ( $MC_2$ )

Fourth, commodity broker makes payment ( $MP_2$ ) to the settlement bank to meet part of the margin call. In the next step ( $MC_3$ ), the broker instructs its own bank to complete the payment ( $MP_3$ ) to the *BKs* on the broker's behalf.

Fifth, the commodity broker ( $MC_4$ ) tells its customer of the shortfall in the latter's account, and instructs the customer to send funds to make up the deficit.

Sixth, the customer ( $MP_4$ ) debits his (or her) account at *BKc* and forwards check ( $MP_5$ ) to commodity broker.

Seventh, the commodity broker deposits check ( $MP_6$ ) in its own bank.

With the completion of step 7, the clearing and settlement system has accomplished its task. Margin calls (debits) have been matched by margin payments (credits). Simultaneously, since gains and losses on commodity futures contracts are settled at the close of business each day, those accounts which gained would have been credited with profits, and those which lost would have been debited to settle losses.

However, the clearing and settlement systems did not function in this way on October 19 and 20, 1987. Instead, on October 19, as selling of NYSE stocks in the S&P 500 increased, prices declined sharply. Consequently, when S&P-SIF opened on the CME, it, too, traded sharply downward. In response, the CME clearinghouse made margin calls on 13 brokerage firms to raise \$290 million. Early in the afternoon, a second round of calls was made this time to 21 brokerage firms for an additional \$660.5 million. A third call was made late in the afternoon to 15 firms to raise \$669.5 million. These brokerage firms in turn made margin calls on their customers, many of whom had to call on their banks for additional loans.

On the morning of October 20, 1987, when stock and commodity markets opened, dozens of brokerage firms and their banks had extended credit on behalf of customers to meet margin calls, and they had not received balancing payments through the clearing and settlement systems. Moreover, the clearing and settlement process was running several hours behind schedule. The magnitude of the risks faced by those market participants dependent on the system is illustrated by the situation of two brokerage firms: Goldman, Sachs and Kidder, Peabody. By noon on October 20, in combination, they faced a cash deficit of \$1.5 billion. This was the amount of their own funds which they had advanced in response to margin calls on their customers. But because of failures in the clearing and settlement systems, these firms' accounts were not credited with funds until mid-afternoon. The exact amount of capital held by these firms as a cushion against loss is not known. However, if they had suffered actual losses on the scale of the recorded exposure, the adverse impact undoubtedly

would have been quite severe. Many other brokerage firms faced comparable exposure.

It was in this environment that the Federal Reserve's second-stage intervention occurred. As margin calls mounted, money center banks (especially those in New York, Chicago, and San Francisco) were faced with greatly increased demand for loans by securities firms. With an eye on their own capital ratios and given their diminished taste for risk, a number of these banks became increasingly reluctant to lend, even to clearly creditworthy individual investors and brokerage firms. As a result of this slowdown in lending, the response to margin calls also slowed down, and uncovered positions became larger and were outstanding for longer periods of time. To forestall a freeze in the clearing and settlement systems, Federal Reserve officials (particularly from the Board and the Federal Reserve Bank of New York) urged key money center banks to maintain and to expand loans to their creditworthy brokerage firm customers.

The banks responded, and the evidence stands out clearly in the statistics. For example, the weekly reporting banks in New York City expanded their loans to brokers and to individuals to purchase or carry securities from \$16.7 billion in the week ending October 7 to \$24.4 billion in the week ending October 21: a gain of \$7.7 billion, or 46.1 percent. At one bank alone (Citicorp), loans to securities firms climbed to \$1.4 billion on October 20, from a normal range of \$200 million to \$400 million.

Over the course of the next few days, the clearing and settlement system resumed its normal functioning. But on October 20, 1987, it staggered on the brink of collapse. If it had done so, it would have pulled down several other major financial sectors. The timely intervention by the Federal Reserve was aimed at diminishing the systemic risks faced by capital markets generally.

## **The Containment of Systemic Risks**

The analysis presented here leads to a clear conclusion: the Federal Reserve System, as the nation's central bank, has a major responsibility in the containment of those types of risks which threaten to disrupt the fabric of the financial system which is so vital to the economy at large. This responsibility extends well beyond the more narrowly defined tasks of controlling the growth rates of the monetary aggregates or influencing the level and structure of interest rates.

The three banking episodes mentioned briefly earlier (Franklin National, SeaFirst, and Continental Illinois) illustrate the ways in which the deposit drains on individual institutions can occur in the modern money market. If they are not checked promptly, the uncertainties they create can undermine major segments of the banking system.

The shock to the commercial paper market created by the failure of the Penn Central Railroad in 1970 caused the Federal Reserve to step in to minimize the risk to a special segment of the capital market. The Federal Reserve Board declined to lend directly to Penn Central, but it did allow the Federal Reserve Banks to channel funds

from the discount window through commercial banks to offset the drain on liquidity in the private sector which followed the shrinkage of the commercial paper market.

In early 1980, as an aftermath of the collapse of intense speculation in the silver market, a number of large broker-dealer firms were pushed to the brink of bankruptcy. The turmoil in silver spilled over to the banks and securities markets and threatened to undermine the financial system as a whole. In this environment, the Federal Reserve urged a group of large money center banks to lend \$1.1 billion to the Hunts to settle their silver-related debts. The repayments forestalled the collapse of several broker-dealer firms, and they averted significant loan losses by a number of banks.

In a similar vein, the Federal Reserve intervened following the stock market crash of 1987. In this instance, the task was to assure the continued functioning of the clearing and settlement systems on which stock and commodity exchanges rest so heavily. In this case, too, the Federal Reserve was fulfilling its strategic role as the ultimate source of liquidity in the economy at large.

■ *This article is a condensed version of the 1988 Distinguished Lecture on Economics in Government, presented to a Joint Session of the American Economic Association and the Society of Government Economists in New York City on December 29, 1988. A copy of the full lecture is available from the author.*

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