What Should the Fed Do About Stock Market Crashes: A Historical Perspective

by Frederic S. Mishkin and Eugene N. White

Frederic Mishkin and Eugene White teach economics at the Columbia University Graduate School of Business and Rutgers University, respectively, and are both research associates at the National Bureau of Economic Research.

In recent years monetary policymakers have worried about asset price bubbles, and, in particular, what they should do about them. The stock market collapse in Japan in the early 1990s has been followed by a decade of stagnation. And in his famous 1996 speech, Alan Greenspan raised the possibility that the U.S. stock market was putting the economy at similar risk in its display of "irrational exuberance."

Whether or not irrational exuberance is a threat, it's is widely agreed that stock market crashes reduce aggregate demand. The shock (a) reduces wealth and thus consumer spending b) raises the cost of capital and thus reduces real investment. Because stock price movements have an important impact on economic activity, central banks trying to conduct monetary policy in an optimal manner will necessarily react to them. It is unclear, however, whether they should react to stock market fluctuations over and above the reaction suggested by their effect on demand through the standard transmission mechanisms.

For example, some analysts argue that central banks should at times react to stock prices in order to stop bubbles from getting out of hand. Alternatively, the monetary authorities might be inclined to try to prop up the stock market after a crash by pursuing a more expansionary policy than the one indicated by the straightforward effects on consumption and investment. Such strategies might be appropriate if stock market crashes produce additional stress on the economy by destabilizing the financial system.

THE CRASHES AND THEIR AFTERMATH

The stress on the financial system from a stock market crash should become visible in risk premiums on interest rates. Indeed, a key sign of financial instability is a large rise in interest rates for borrowers whose credit is called into question by falling asset prices. One would expect a much smaller effect on interest rates for borrowers whose credit is widely understood to be solid. Consequently, a stock market crash that produces financial instability should lead to a rise in interest-rate spreads between high quality bonds and those with lesser credit ratings.

To see whether stock market crashes are associated with financial instability, we look at all stock market crashes in the 20th century, examining what happened to interest-rate spreads and real economic activity. (Figure 1-3 show these data for several of the episodes. Real activity is measured by real GDP in 1972 dollars, the interest-rate spread by the difference between the interest rates on Moody's Aaa and Baa corporate bonds, and stock prices by the Dow Jones Industrial Index and the S&P 500 Index..)

Whether a stock market crash will have a distinct and severe effect on the credit terms for higher risk borrowers (thereby transmitting an independent shock to the economy) depends critically on two factors. First, the condition of the financial system just before the crash is important. If the system is weak – if it is highly leveraged or has experienced cumulative shocks -- it is more likely that a crash will induce lenders to raise interest-rate spreads and produce financial instability. Second, given that a shock transmitted from the stock market crash promotes financial instability, the monetary authorities' reaction is critical. They can ignore the shock, in which case interest rate spreads will rise sharply, or they can inject liquidity into the system and dampen its effects. Note,

too, that the more rapid and violent the crash, the more likely it will be a surprise, giving lenders less time to make adjustments other than altering credit terms.

On the face of it, defining a stock market collapse is simple: when you see it, you know it. However, a precise definition is more difficult. To screen for the biggest stock market declines, we examined the behavior of three well known stock indexes – the Dow Jones Industrial Average, the Standard and Poor's 500 (and its predecessor, the Cowles Index) and the NASDAQ composite index.

As October 1929 and October 1987 are universally agreed to be stock market crashes, we used them as benchmarks. On October 28 and 29, 1929, the Dow Jones declined 12.8 and 11.7 percent; and on October 19, 1987, the Dow Jones fell 22.6 percent. As both fell slightly more 20 percent, a 20 percent drop in the market is used to define a crash. The size of the decline is, however, only one characteristic of a crash; speed is another. Therefore, we look at declines over windows of one day, five days, one month, three months, and one year. To cast a net that captures both speed and depth, we sorted the percentage changes for each window and looked at the fifty largest declines. Our screening procedure identified 15 major stock market crashes in the 20th century.

We think it is useful to fit the 15 crashes into four categories.

- Episodes in which the stock decline did not appear to put stress on the financial system because interest-rate spreads did not widen appreciably. These include the crashes of 1903, 1940, 1946, 1962 and 2000.
- Episodes in which the crashes were extremely sharp and which put stress on the financial system, but where there was little widening of spreads subsequently because of intervention by the Federal Reserve. These include the crashes of 1929 and 1987

discussed in Box 1.

- 3. Episodes in which the crashes were associated with large increases in spreads suggesting severe financial distress. These include the crashes of 1907, 1930-33, 1937, 1973-74.
- Episodes in which the crashes were associated with increases in spreads that were not as large as in the third category, suggesting some financial distress. These include the crashes of 1917, 1920, 1969-70 and 1990.

What conclusions can we draw? First, the fact that stock market crashes in category 1 are not accompanied by increases in spreads implies that dramatic stock declines need not produce financial instability. These are cases in which both corporate balance sheets and the financial system are in good shape before the onset of the crash – and in which accompanying economic downturns tend to be fairly mild. Secondly, very sharp stock market crashes like those in 1929 and 1987 (category 2) do have the potential to disrupt financial markets. But actions by the central bank to prevent the crashes from seizing up markets—as distinct from actions designed to prop up stock prices--are able to prevent system-wide instability. Third, situations in which financial instability becomes severe (category 3 cases, where spreads widen substantially) are associated with the worst economic downturns.

Because stock market crashes are often not followed by financial instability, we should be cautious about assigning causality from timing evidence. Certainly, one cannot make the case that crashes are always the main cause of financial instability. Indeed, in many episodes, it is possible that the financial instability was caused by independent factors, such as the collapse of the banking system or the severity of the economic contraction. Only in the case of the extremely sharp market crashes as in 1929 and 1987 do we have more direct evidence that some financial markets were unable to function as a direct result of the crash. The theory of how stock market crashes can

interfere with the efficient functioning of financial markets suggests that the impact of a stock market crash will largely turn on the conditions of balance sheets before the decline.

IMPLICATIONS FOR MONETARY POLICY

What, then, are the implications for monetary policy? The first is that financial instability – not the stock market crash in itself – is the key challenge facing policymakers, even if the decline reflects the bursting of an asset price bubble. If the balance sheets of financial and non-financial institutions are initially strong, a market crash is unlikely to lead to systemic instability. In this case, the decline of stock prices will affect real output through the usual wealth and cost of capital channels, only requiring the monetary policymakers to respond directly to the decline on aggregate demand.

However, central banks may see the need to respond directly to a stock market crash when asset price declines put stress on the financial system. That is just what the Fed did in 1929 and 1987, when it had good reason to believe that financial markets would otherwise be unable to function. What's important in both episodes is nature of the stress on financial markets. The trauma had more to do with the speed of the stock market decline than the overall percentage drop -- which has at times been far larger, yet had little impact on the financial system. Furthermore, in both episodes, the focus of the Federal Reserve was not to try to prop up stock prices, but to make sure that the financial markets would function normally.

This focus on financial instability also implies that central banks should respond to disruptions in the financial markets even if the stock market is not a major concern. For example, the Fed responded aggressively to prevent a financial crisis after the Penn-Central bankruptcy in June 1970 without much concern for developments in the stock market, even though the market had

fallen substantially from its peak in late 1968.

In the aftermath of the Penn-Central bankruptcy, the commercial paper market – the market for short-term corporate debt securities -- stopped functioning and the Fed stepped in as a lender-oflast-resort. The New York Fed contacted key money-center banks, encouraged them to lend to customers who were unable to roll over their commercial paper, and made clear that Fed credit would be available to the banks so that they would have adequate resources to make these loans. The banks followed the Fed's "suggestion," borrowing \$575 million for this purpose. In addition, the Fed, along with the Federal Deposit Insurance Corporation and the Federal Home Loan Banks, decided to suspend rules limiting interest rates on deposits of \$100,000 or more in order to keep market interest rates from rising. And the Fed also indirectly supplied liquidity to the banks by purchasing bonds in the open market.

Similarly, in the fall of 1998, the Fed flooded the system with money, lowering the federal funds rate (the rate banks charge each other on overnight loans needed to meet reserve requirements) by three-quarters of a percentage point, even though stocks were trading at levels considered to be very high by Federal Reserve officials. The Fed's intervention stemmed from concern about the stress created by the collapse of the ruble, and by the failure of Long Term Capital Management.

A spectacular lender-of-last resort operation was also carried out in the aftermath of the destruction of the World Trade Center on 9/11. Because of the disruption to the payments system, the cash needs of the financial system skyrocketed. To satisfy this need and so protect the financial system from gridlock, the Fed acted as it had in the 1987 stock crash. It made an unusual public announcement, reminding the world that the "Federal Reserve System is open and operating. The discount window is available to meet liquidity needs." The Fed then proceeded to lend \$45 *billion* to banks -- a 200-fold increase over the previous week! As a result of this action, along with the

decision to pump some \$80 billion of reserves into the banking system through open market purchases of government bonds, the financial system kept functioning. When the stock market reopened on Monday, September 17, trading was orderly -- although the Dow did decline.

These examples suggest the importance of focusing on the potential for financial instability. Excessive focus on the stock market might have led central banks to fail to take appropriate actions as in 1970, 1998 and 2001, when the stock market was not a primary concern.

Too great a focus on the stock market also presents other dangers for central banks. Attention on asset prices -- in this case, the price of common stocks -- can lead to the wrong policy responses. The ideal response to a change in asset prices very much depends on the source of the shock and its duration.

Consider Chile's and New Zealand's decisions to tighten monetary policy in response to the downward pressure on the exchange rates of their currencies in the aftermath of the East Asian and Russian crises in 1997 and 1998. Since the shock effectively raised the price of imports and lowered the value of exports, it would have better been met by an easing of monetary policy rather than a tightening. Not everyone made the mistake: the Reserve Bank of Australia eased monetary policy after the collapse of the Thai baht in July 1997 because the Bank rightly focused on inflation control rather than the exchange rate. The excellent performance of the Australian economy compared to that of New Zealand and Chile during this period illustrates the benefit of keeping eyes fixed on its primary objectives rather than on an asset price.

A second problem with a central bank focus on stock prices is that it raises the possibility that the central bank will be made to look foolish. The linkage between monetary policy and stock prices is weak. Most fluctuations in stock prices occur for reasons unrelated to monetary policy, either reflecting real fundamentals or what Keynes dubbed "animal spirits." And the capacity of central banks to control stock prices is thus very limited. Hence, if the central bank indicates that it wants stock prices movements to change in one direction and the opposite occurs, it will look inept. Recall that Alan Greenspan made his speech irrational exuberance speech in 1996, when the Dow was around 6,500. This didn't stop the market from rising to well above 11,000.

A third pitfall in focusing on stock prices is that it may weaken political support for the central bank because the attention leaves the impression that the bank is meddling where it doesn't belong. Part of the reason central banks have been successful in recent years is that they have narrowed their focus and have more actively communicated what they will/can do. Specifically, central banks have argued that they are less capable of managing short-run business cycle fluctuations, and should therefore focus more on long-term price stability. This communication strategy has been very successful part of inflation targeting, a monetary regime that has been gaining in popularity in recent years. Moreover, by narrowing their focus, central banks have been able to increase support for their independence. Extending their focus to asset prices could cause the public to worry that the central bank is exercising undue influence.

A fourth problem with focusing on the stock market is that it may create a form of what economists call "moral hazard." Knowing that the central bank is likely to prop up the stock market if it crashes, market participants are more likely to bid up prices. Hence central bank interest may feed excessive valuation of stocks and make a stock market bubble more likely.

This begs the question of whether monetary authorities should try to prick asset-price bubbles. After all, subsequent collapses can be highly damaging to the real economy – think of Japan. Some analysts argue that central banks should, indeed, react to asset prices in order to prevent bubbles from inflating. However, we see serious flaws in this argument. In addition to the objections we have raised to a focus on asset prices, it is important to recognize that it is very hard for monetary authorities to determine if a bubble has actually developed. To assume that they can is to assume that the central bankers have better information and predictive ability than the private sector. Yet the view that government officials know better than the markets has been proved wrong over and over again.

BOTTOM LINE

The key problem facing monetary policymakers is not stock market bubbles, but financial instability -- which may or may accompany market crashes. Indeed, the 2000-2001 crash (discussed in Box 2) had little impact on interest-rate spreads, and apparently did not lead to financial instability. Thus, the current environment is not one that requires a broad response to the stock market bust. By focusing on financial stability rather than stock prices, central banks are both more likely to manage their core task well and to maintain political support for their independence.

Box 1 The Big Ones

The great crashes of 1929 and 1987 are an important pairing. The pattern of the crashes was similar, as was the Federal Reserve's successful lender-oflast resort intervention to prevent effects of a crash from spilling into the rest of the financial system. The Fed's subsequent responses, however, were very different.

1929. On the two days, October 28-29, the Dow fell a total of 24 percent. All told, the DJIA was down 19.6 percent for the month, and fell another 22 percent in November. Although there was a brief recovery early in 1930, the market fell almost continuously for the next two years, producing the deepest long-term

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market decline by any measure.

The behavior of the interest-rate spread is puzzling at first glance: it increases as the market moved upward in late 1928 and 1929, then fell along with stock prices. Only from mid-1930 on do spreads soar off the chart. This pattern can largely be explained by Fed actions. The Fed tightened credit in early 1928 and tightened it further in February 1929 in response to soaring stock prices, instructing banks to limit loans to brokers. Finally, it raised the discount rate in August 1929. Fed pressure did not suppress the demand for credit to buy stock, which was supplied by other intermediaries. Nevertheless, the market did extract a premium on brokers' loans, reflecting lenders' concerns that the rise in the market was not sustainable. Volume in the market for commercial paper fell by half, while issuance of foreign bonds virtually terminated.

When the market collapsed in October, lenders in New York rushed to liquidate their loans to brokers. To keep the loan market from freezing solid, the Federal Reserve Bank of New York engaged in a classic lender-of-last-resort operation, and in addition purchased some \$160 million in bonds in "open market" operations. As a result, there were no panic increases in money market rates or threats to banks from defaults on brokers' loans and the interest-rate spread declined (Figure 1).

Unfortunately, the Federal Reserve Board in Washington did not approve of the New York Fed's intervention. It censured the New York bank and, in spite of the recession that had begun during the summer, it maintained a tight monetary policy. The tentative recovery in 1930 was aborted and numerous bank panics followed. The continued decline in stock prices through early 1933 and the rise in the interest-rate spread reflected the economy's Fed-aggravated slide into depression.

The collapsing economy placed enormous stress on the banking system, and the subsequent banking crises magnified the economic decline. Risk premiums soared, as lenders fled from risky borrowers.

The stock market collapse shows the importance of the two factors we have identified in high relief. In 1929, the banking system was relatively weak and

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the drop in the market was large and sudden. However, the effects were quickly contained by the response of the New York Fed. Yet, the less sudden decline in asset values in the 1930s led to rising risk premiums because the Fed stuck to tight money.

1987. On October 19, the Dow fell 22.6 percent, the largest one-day decline ever. Thus, the pattern of the rise and fall of the market for 1926-1929 and 1984-1987 look remarkably similar.

Unlike the 1920s, the Fed in the 1980s was no longer preoccupied by speculation, but it was concerned about inflation and tightened policy to prevent any acceleration. At the outset of the stock market boom, the money supply (defined in a variety of ways) had increased at a fairly rapid pace. But, in the first six months of 1987, its growth slowed considerably. Money markets, worried about rising foreign interest rates, trade deficits and a weak dollar, drove up interest rates in the U.S. rose in anticipation of the Fed's likely response. But the economy continued to grow, and the interest rate spread declined even as the market moved into the last phase of the boom (Figure 2).

The sharp decline on October 19 put the financial system under great stress because brokers needed to extend huge amounts of credit on behalf of their customers for margin calls. Kidder Peabody and Goldman Sachs alone advanced \$1.5 billion in response to margin calls on their customers by noon of October 20. Despite the financial strength of the leading firms, there was so much uncertainty that banks were reluctant to lend at a time when credit was most needed.

To prevent a collapse of both the brokerage firms and the settlement process, Alan Greenspan announced before the market opened on October 20 that the Fed was ready "to serve as a source of liquidity to support the economic and financial system." The Fed bought \$17 billion worth of bonds, adding liquidity equal to one-quarter of bank reserves. In addition, commercial banks were told that they were expected to continue to lend to broker-dealers to ensure that the brokers could carry their inventories of securities. Spreads widened at the outset of the crisis, but quickly decreased in response to the Fed's actions. As financial markets calmed, the Fed carefully withdrew most of the extra bank reserves, keeping overnight loan rates about one percentage point below the precrash level.

Thus the crash ended up not being a threat to the stability of the financial system despite the large loss in equity values. Bank failures and loan losses were rising rapidly in the late 1980s, yet the crash did not damage the susceptible financial system. The Fed's lender of last resort operation was as successful as in 1929. But this time, subsequent monetary policy was focused on financial stability, not the stock market.

Box 2

The Last One

The current bear market began in August 2000, with the S&P 500 falling 23 percent by December 2001. The collapse mirrored the slowing economy, which slid into recession in March 2001. However, it important to note that the collapse in stock prices was not evenly felt across the market. Between August 2000 and December 2001, the Dow Jones dropped approximately 11 percent, the S&P500 fell 23 percent and the NASDAQ nearly 49 percent.

The higher tech, higher risk stocks took a beating. Yet, this did not immediately translate into a higher risk premium for these borrowers and hence a higher interest-rate spread, even in the aftermath of 9/11 (Figure 3). One explanation is that the financial system has been stronger than at any time since the 1960s. Weak banks have been culled through failure and merger, while new regulations and a long period of growth have made banks less susceptible to a sudden decline in asset values. Thus, there was no reason for a squeeze on less creditworthy customers, despite the decline in the stock market.

There was a sharp increase in the interest rate spread in December 2001, which continued into 2002. But this development reflected the Enron scandal – not the decline in the stock market. Revelations of fraud and misleading accounting made clear that the quality of information about corporations was poorer than the markets had supposed. And it thus is not surprising that lenders became more cautious.

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Crash of 1929









Crash of 2000

