

Introduction and Summary

Since October 1987, a number of careful investigations of the stock market crash have been prepared, and each has added to our understanding of what did—and what did not—occur. Studies have explored the reasons for the crash and have made recommendations for preventing another such episode. The collection of articles in this *Quarterly Review* represents an effort to achieve a still better understanding of certain significant technical issues related to equity market performance. Many of the questions examined here have been debated by economists and others for many years and will no doubt be debated for years to come. Looked at in that light, the results presented in these papers are offered not as definitive answers to these questions, but rather as contributions to the ongoing discussion of the workings of equity markets here and abroad.

The first three articles discuss the international character of the crash. One is an econometric test of the proposition that a particular form of speculative price development, called “rational speculative bubbles” by economists, preceded the crash in the United States, the United Kingdom, and Japan. The next two pieces analyze the worldwide transmission of the disruption from one national stock market to another. The last three articles examine the role of equity-related margin requirements in the United States. One summarizes the diverse margin rules in the various markets. Another discusses the analytical and conceptual issues surrounding the question of making margins “consistent” across markets. And the last piece introduces some new evidence into the debate about how margin requirements may affect stock market activity.

The stock market crash was a thoroughly international event, and its worldwide nature needs to be better understood. In the first article in this issue, Gikas Hardouvelis examines the notion that the October crash was preceded by the buildup of speculative price movement in major world stock markets. Noting that it is difficult to make an empirical distinction between bubble-type price movements and movements based on changes in fundamental values, Hardouvelis chooses to test a specific theoretical model of speculative behavior, rational price bubbles. With this approach, he finds that the data are consistent with the existence of such a speculative bubble in the United States in the period before the crash. He finds similar evidence in Japan, but concludes that the case for a pre-October bubble in the United Kingdom is weaker.

Hardouvelis’ findings square with the widespread opinion that in the months leading up to the crash, stock prices in various centers had an upward bias that was not related in obvious ways to economic fundamentals. A somewhat loose but probably fair interpretation of the statistical work is that the October fall in stock prices was preceded by speculative trading activity that pushed prices above their fundamentals; and, once the correction was underway, it took on special dynamics of its own.

In the second article, Paul Bennett and Jeanette Kelleher focus on the dynamic interactions among stock price movements in different countries during the crash. Were the interactions characteristic of the behavior of major stock markets during prior, less dramatic periods of volatility? In what respects were the worldwide relationships in October unique? Did recent

trends in cross-border trading and investments in stocks influence these relationships?

Bennett and Kelleher estimate statistical equations describing how major markets had interacted during previous periods of stress. They find patterns that in certain key respects suggest that the international character of the downward break in stock prices in October should not be regarded as especially surprising. In the pre-October data, unusually high daily price volatility in one market tended to coincide with above-average volatility in other markets as well. Moreover, when prices became especially volatile in episodes prior to October 1987, the alignment of up and down movements among markets became unusually close—that is, foreign and domestic stock price movements tended to become more closely correlated.

The growing internationalization of stock trading and investment activities may have changed the patterns of interaction among national stock markets in recent years. Bennett and Kelleher find that price indexes in major markets have in fact moved more closely together in the 1980s than in earlier years, both on a day-to-day and a month-to-month basis. They also show that a given rise in daily volatility has, on average, been associated with a greater increase in correlation between markets in the 1980s than in the 1970s. However, the propensity of high volatility in one market to be associated with high volatility in others was about the same in the two decades.

To relate their findings to the crash, the authors examine how well their estimated relationships characterize the October interactions among major markets. In October 1987, correlations of day-to-day price movements among key markets increased approximately as they had in previous periods of high volatility. At the same time, however, the spillover of volatility from one market to another far exceeded even the substantial extent of transmission predicted by the precrash relationships. This aspect of the crash was unusual, particularly because—as noted above—little evidence existed in the precrash data to suggest that the propensity of volatility to spill over from market to market had risen in the 1980s.

Bennett and Kelleher's findings support the view that extreme price disruption in a major stock market is systematically associated with disruption in other markets. Thus, to the extent that the likelihood of excessive volatility can be reduced in any one major market, other markets stand to benefit as well.

In the next article, Aderhold, Cumming, and Harwood examine the possible roles of cross-border investment flows and of stock trading in centers outside the home market in promoting October's simultaneous downturns in major world stock markets. This analysis focuses on

the patterns of international stock trading flows and price movements in the days surrounding the crash. Although the methodology of this article differs significantly from that of the preceding piece, the two sets of findings reinforce one another.

Aderhold, Cumming, and Harwood show that direct international linkages—cross-border investments and 24-hour trading—played at most a limited role in the simultaneous declines in major markets. Only in Japan did cross-border selling by nonresidents appear to exacerbate the crash significantly. Twenty-four-hour trading seems to have been an important factor only with regard to U.K. equities traded in the United States in the form of American depositary receipts (ADRs); price declines on these ADRs were transmitted into U.K. share prices. Overall, however, the direct international linkages among the largest markets were not developed enough to account for a dominant share of total activity in those markets during the crash period.

Nevertheless, information links among major markets are now extraordinarily good, and direct trading and clearing linkages are in the early stages of development and likely to evolve further. The authors suggest that the surge in foreign stock turnover in London during the crash hints at the broader potential for streamlined international trading links to transmit price reactions across markets in the future. Thus, while direct trading and investment linkages were not the principal cause of market interactions in the crash, the trend toward worldwide integration is continuing, and it may further increase the sensitivity of the major stock markets to one another.

The last three articles in this issue take up topics related to margin requirements on various equity instruments. In "Margin Requirements on Equity Instruments," George Sofianos outlines the structure of margin requirements for stocks, stock options, and stock index futures and options, not only for retail transactions but for professional trading as well. In the process of describing the margin rules, Sofianos' piece conveys the complex variety of approaches taken at the various exchanges. The differences in rules reflect not only differences in regulatory structures and in the roles assigned to margin requirements, but also the current diversity of clearing and settlement arrangements.

In the following article, Arturo Estrella provides some conceptual guidance for assessing the adequacy and consistency of equity-related margins among the numerous classes of instruments, participants, and trading arenas. He notes that whether margin levels are adequate or whether a sufficient degree of consistency exists across markets depends on the purposes assigned to margin requirements. Moreover, even when

the role of margins is reasonably well defined, consistency can be hard to define and evaluate.

Estrella illustrates this point by outlining an approach to evaluating the relative adequacies of stock and stock index futures margins, using protection of market integrity as the criterion. Briefly, his approach is to simulate a variety of price outcomes and to compare how well different systems of margins perform. The simulations take into account the risk diversification in index futures, the different amounts of time currently allowed for margin payments in the various markets, and the different levels and configurations of margin requirements. On the one hand, the results indicate that the cash market margins and the much lower initial futures margins provide a similar degree of protection against the possibility that price movements will exceed margin buffers. On the other hand, the likelihood of large margin calls is much greater in the futures market. Large margin calls arguably carry the potential to accelerate price movements or to raise concerns about the integrity of market participants and clearing mechanisms. Thus the assertion that margins are effectively similar in the two markets must be qualified to the extent that the higher-leveraged futures margining system depends on the ability to meet these sizable calls.

The need to assess the consistency of margins across markets in light of the objectives sought in imposing these requirements stands out especially clearly with respect to equity-related options. Options by nature can provide purchasers with greater leverage than other instruments. Nevertheless, option buyers stand to lose no more than their original premium payment, whereas option sellers face potentially unlimited risks due to price changes. If the goal of margin requirements is narrowly defined as protection against failed contract performance by writers of options, margins on stock-related options can be set so that the probability of losses exceeding margin buffers can be made as small as for stocks. On the other hand, margins set at levels consistent with an acceptably small probability of contract failure by option writers might also be consistent with a very high degree of implicit leverage, that is, very high gearing of risk by option purchasers. This high leverage in turn might conflict with other purposes of margin requirements.

Estrella explains that the diversity of clearing and settlement arrangements, which creates important differences among instruments in the timing of margin

payment flows, is another obstacle to achieving consistent margin requirements for different equity-related instruments. More margin is needed to protect against losses when it takes several days to collect additional margin calls than when it takes only a few hours. Estrella concludes that determining proper degrees of consistency and adequacy for margin requirements must involve a large measure of good judgment in addition to technical analysis.

The link between the purpose of margins and their adequacy and consistency highlights another important issue: How much can margin requirements realistically be expected to accomplish? However important any one goal for margin requirements might appear, the question remains whether the tool can help with the job. In the final article in this issue, Gikas Hardouvelis examines the argument that margin requirements help protect the stock market by reducing excessive price volatility.

Hardouvelis investigates how the volatility of stock price movements since the 1930s has changed as Federal Reserve initial margin requirements have changed over the same period. His statistical results are consistent with the notion that higher margin requirements can help to reduce volatility. However, volatility of stock prices is not necessarily undesirable if it reflects changes in underlying determinants of values. Therefore, he extends his statistical formulation to control for volatility of fundamental influences on stock prices. He also adjusts for the historical propensity of the Federal Reserve to react to volatility in setting margin requirements. The simple relationship between stock price volatility and margin requirements could be a distorted indicator of the effect of margins on volatility, since margin requirement levels traditionally have been adjusted partly in response to erratic price changes. After statistically controlling for these factors, Hardouvelis finds that the original inverse relationship between margins and volatility holds up.

As noted earlier, the purpose of these articles is not to suggest that they—individually or collectively—are the final word on the various technical aspects of equity market behavior addressed in this issue. However, taken as a whole, they should provide insights and suggest new lines of inquiry as observers, analysts, and policymakers seek a better understanding of the complex forces at work in equity markets in the United States and elsewhere.