

International Linkages among Equities Markets and the October 1987 Market Break

Equities markets around the world lost, in total, about \$1.2 trillion in market capitalization during the October 1987 crash. Half of the losses took place on stock markets outside the United States. The speed, size, and simultaneity of the price declines in such a wide variety of markets stunned participants and observers alike and prompted a search for explanations.

In the United States, structural features such as the market-making mechanism and the interaction of the stock market with equity-related futures and options markets have received considerable attention. But these features differ across national boundaries and hence do not easily explain the similar downturns around the globe.

This article considers the role of direct international linkages across markets in promoting October's simultaneous downturns. These linkages take two principal forms: cross-border equity investment and stock trading in centers outside the home market. A review of the October experience suggests the following:

- Direct international linkages cannot explain the worldwide decline in equities markets in mid-October. In the three largest equities markets—New York, Tokyo, and London—cross-border selling of equities played a significant role only in Tokyo, and trading of stocks outside the home market mainly affected U.K. equities traded in the form of American depositary receipts.
- The limited role of direct international linkages in the crash in these markets reflected the small scale of international equity investment and 24-hour trading relative to activity in the large markets

and the absence of heavy selling by cross-border investors based in some large countries.

- Thus, the primary international linkage was indirect. In the charged atmosphere of October 19 and 20, market participants read steep price declines overseas as signals of the price direction in their own market.
- In the weeks after the crash, international investors liquidated large amounts of equities and slowed other financial investment overseas. But the slowdown fell short of the widespread withdrawal and repatriation of funds feared in the immediate wake of the crash. It appears that many sellers resided outside the G-10 countries and had few investment opportunities at home.

The surge in international activity in equities

Cross-border investment

Equities achieved unusual prominence in international investment after 1984. Investors participated in overseas equities markets by building a portfolio of foreign stocks, investing in mutual funds specializing in global equities, and purchasing derivative equity instruments such as convertible bonds and equity warrants. An impression of the growth of cross-border investment can be gained by looking at five major domestic markets for which timely, though imperfect, data are available.¹ Canada, Germany, Japan, the United Kingdom, and the United States.

¹Data measuring international flows in equities are, like most capital flow data, subject to a number of shortcomings. The problems include confusion between *residence* and *nationality*, gaps in coverage, difficulties in recording conversions of convertible bonds

Cross-border investment in equities picked up sharply from 1985 until the beginning of the fourth quarter of 1987. In 1986 in particular, net equity purchases by nonresidents more than tripled in the United States and Germany and rose by more than one half in the United Kingdom (Table 1). Generally, stock markets throughout Europe and the Far East appeared to benefit from strong international purchases.

Japan, however, was a notable exception, as international investors sold Japanese shares out of concern that the market was overvalued. These international investors, mainly U.S. and U.K. institutional accounts such as trust and pension funds, had been net purchasers of Japanese shares until 1984.² Ironically, the selling developed just before the yen began to rise and sizable dollar returns on yen investments emerged.

The buying in the North American and U.K. markets

Footnote 1 continued

and equity warrants into shares, and reporting errors. The definition of equities varies from country to country—some include preferred stock while others do not. An investment position may be classified as a direct investment or a portfolio investment depending on the share of outstanding equity held by a single investor. Finally, in this article, cross-border equity flows for the United Kingdom are measured by proxies.

²The net sales position of nonresidents in Japan may sometimes be overstated. Nonresidents can acquire Japanese shares by exercising equity options on eurobonds, usually in the form of equity warrants. These acquisitions are not included as nonresident purchases in some statistics, such as those produced by the Tokyo Stock Exchange (TSE), while sales of such shares are included as nonresident sales. The Bank of Japan's capital flow statistics in Table 1 include a measure of equity acquired through exercising options and still report very large net sales.

and the selling in Japan increased in the first nine months of 1987. Net nonresident purchases in the first three quarters in Canada, the United Kingdom, and the United States exceeded the amounts purchased in these markets in the full year 1986, while net sales in Japan picked up as rapidly increasing prices drove Japanese price-to-earnings ratios to 60 or more, compared with 15 to 30 in other major markets.

Who were the major buyers in the surge in cross-border investment? The nationality of the end-investors is often difficult to determine because many investors make their overseas investments through international financial centers. A large portion of investment activities in the United Kingdom are conducted on behalf of investors located outside the country, such as U.S. pension funds and other international institutional accounts. Substantial amounts of equities are purchased through Switzerland and some offshore centers, which serve international clients from both industrial and developing countries.

Nevertheless, it appears that in 1986 participation in cross-border equity investment was geographically broad-based, with investors in all five major countries in Table 1 increasing their net cross-border purchases. U.K. and Japanese residents expanded their buying most sharply. Large flows through international centers such as the United Kingdom and Switzerland suggest that at least a portion of cross-border equity investment came from outside the G-10 countries.

In the first nine months of 1987, however, Japanese residents alone appeared to fuel the continued expansion of cross-border equity investment; their buying

Table 1

The Expansion of Cross-Border Equity Flows before the Break

In Billions of Dollars

	Nonresident Net Purchases*			Net Purchases of Foreign Equities*		
	1985	1986	1987	1985	1986	1987
			Jan -Sept			Jan -Sept
<u>Of domestic equities in</u>				<u>By residents of</u>		
Canada	0.8	0.5	4.2	Canada	0.4	1.6
Germany	2.1	6.8	2.9	Germany	1.6	2.4
Japan	-0.7	-15.8	-21.9	Japan	1.0	7.0
United Kingdom†	6.0	9.6	11.2	United Kingdom‡	5.6	10.5
United States	4.9	18.7	23.3	United States	1.9	2.4

*(-) = net sales

†Transactions by overseas residents in U.K. company securities, believed to be largely equities

‡Net purchases of ordinary shares of overseas companies by nonbank financial institutions

Sources: Statistics Canada, *Security Transactions with Nonresidents*, Table 3, Statistics Canada, *Quarterly Estimates of the Canadian Balance of International Payments*, Table 1; Deutsche Bundesbank, *Balance of Payments Statistics, Statistical Supplements to the Monthly Reports of the Deutsche Bundesbank*, Series 3, Table 5d, Bank of Japan, Foreign Department, *Balance of Payments Monthly*, "Long-Term Capital", Central Statistical Office (United Kingdom), *Financial Statistics*, Tables 7.1 and 8.7, U.S. Department of Commerce, *Survey of Current Business*, Tables 2, 6, and 9, Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, Table 3.24

accounted for two-thirds of the net equity purchases by residents of the five countries cited in Table 1. From January to September, Japanese residents purchased \$13.5 billion net—an amount that, when annualized, was more than double the previous year's purchases. Much of those funds flowed to the United States. According to U.S. Treasury data, Japanese purchases of U.S. equities came to \$9.5 billion in the first nine months of 1987.

Despite the growth in cross-border equity investment, the share of foreign ownership remained low in the largest markets. The foreign-held share of equities outstanding was lowest in Japan and the United States at around 5 percent, and somewhat higher in the United Kingdom at 10 percent. In contrast, foreign ownership ranged from 25 percent to 35 percent in some other European markets.

Cross-border trading

Cross-border investors not only increased their net purchases in 1986 and 1987, but also traded their portfolios more actively. The value of their gross transactions soared over 1986 and 1987 (Table 2). Viewed across market centers, the rise was geographically broad-based in 1986, but became somewhat more concentrated in 1987, because of the continued rapid growth of cross-border transactions in the Japanese and U.S. equities markets³

Viewed by country of investor residence, transactions by residents of Japan and the United States accounted for most of the growth of cross-border transactions in 1986 and 1987. The high value of transactions reflected the importance of institutional investors, includ-

ing mutual funds, in the two countries and the emphasis placed on active management of institutional investment portfolios. Japan's equity transactions more than doubled in the first nine months of 1987 compared with the previous year. Cross-border equity trading by residents of the four countries cited in Table 2 accounted for roughly half of the total transactions volume by nonresidents recorded in those same four countries. Available bilateral flow data suggest that U.K. residents accounted for a large part of the remainder.

Growth in transactions by nonresidents, however, coincided with strong growth in home market transactions by domestic residents, so that in many larger markets, the foreign share of transactions remained low. In Japan, for example, nonresidents churned their stock portfolios to realize gains from rising prices in the overall market. In value terms, their gross transactions during the first nine months of 1987 more than tripled on an annual basis compared to 1984 (Table 3). This increase was less, however, than the rise for any other investor group in the Japanese market. Foreign transactions represented just over 10 percent of the turnover on the major stock exchanges in the United States and Japan, around 20 percent in the United Kingdom (where a large proportion of all nonresident transactions in London involved foreign stocks listed on the International Stock Exchange), and nearly 25 percent in Canada and Germany.

In summary, by September 1987, the activities of cross-border investors had grown considerably in most major equity markets, but the foreign share of total stocks outstanding and of transactions volume remained fairly low in the largest markets. Thus, quite concentrated selling by nonresidents would have been

³Transactions data are not available for the United Kingdom

Table 2

The Expansion of Cross-Border Equity Transactions Value before the Break

Sum of Gross Purchases and Sales in Billions of Dollars

Nonresident Transactions	1985			1986			1987		
	1985	1986	1987	1985	1986	1987	1985	1986	1987
In domestic equities in			Jan -Sept				By residents of		Jan -Sept
Canada	11.3	18.9	33.7	Canada	18.8	32.8	37.5		
Germany	38.3	77.1	59.3	Germany	20.6	43.1	48.1		
Japan	81.3	189.6	278.0	Japan	10.0	34.8	88.6		
United States	159.0	277.5	359.7	United States	45.7	100.2	142.0		

Sources: Statistics Canada, *Security Transactions with Nonresidents*, Table 3, Statistics Canada, *Quarterly Estimates of the Canadian Balance of International Payments*, Table 11, Deutsche Bundesbank, *Balance of Payments Statistics, Statistical Supplements to the Monthly Reports of the Deutsche Bundesbank*, Series 3, Table 5d, Bank of Japan, Foreign Department, *Balance of Payments Monthly*, "Long-Term Capital", U.S. Department of Commerce, *Survey of Current Business*, Tables 2, 6, and 9, Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, Table 3.24

necessary to make a profound impact on stock prices in New York, London, and Tokyo.

Twenty-four-hour trading

Trading of stocks on exchanges outside the home country was the other principal channel for increased international equities trading and investment. Markets for foreign stocks had developed chiefly in New York and London. Those markets remained confined to particular segments of the global equities market, notably U.K. stocks in New York and Continental European stocks in London. Only a small market for foreign stocks existed in Tokyo.

In New York, the principal instrument for trading in overseas shares is the American depositary receipt (ADR). ADRs are certificates that represent a given number of shares of a foreign firm and are traded like the public shares of U.S. companies. U.S. commercial banks hold the underlying foreign shares in custodial accounts in their London branch offices. The most actively traded ADR issues, with few exceptions, are the "sponsored" programs of U.K. companies.⁴

Agent banks estimate that the ADR investor base is largely institutional; about 10 percent to 20 percent is retail. Institutional ADR investors are often newcomers to the international share markets. Some have bylaws that prevent them from purchasing securities not registered in the United States while others may be able to hold shares directly but prefer to keep some holdings

⁴Under a sponsored ADR program, a foreign company designates a U.S. commercial bank as custodian for the ADR program

in ADR form for liquidity reasons (essentially because New York's five-day settlement period is often short compared to other markets).

The International Stock Exchange (ISE) in London has the most extensive market in foreign equities. Before the market break in October, about 800 foreign equities were quoted on the ISE's automated quotation system (SEAQ International); roughly 200 were actively traded. The London foreign share market primarily consisted of European equities, with French and German shares accounting for about a third of the value of securities traded daily in September 1987. Trading in U.S. shares, in contrast, amounted to only 5 percent of daily transactions value or about \$50 million per day. Trading in Japanese stocks was somewhat greater, amounting to around 10 percent of daily transactions value or roughly \$100 million a day.⁵

From Big Bang—the liberalization of the U.K. domestic securities markets in October 1986—to September 1987, foreign share trading on the ISE grew 70 percent, reaching £525 million (\$850 million) a day. Before the October 1987 market break, it constituted almost one-third of total equity turnover value on the exchange. Foreign equities were also widely traded in London off the ISE; the ISE estimated the off-exchange volume to be roughly equal to that on the exchange. Institutional investors dominated trading in foreign equities, as reflected in an average transaction size of £140,000, roughly five times that of the domestic sector; and over half of the trading was done by nonresidents.

The foreign stock section of the Tokyo Stock Exchange (TSE) grew rapidly from a very low base but remained relatively unimportant. Trading value in the first nine months of 1987 tripled from the previous year but still amounted to only 1.5 percent of TSE trading value. Listings rose from 11 companies at the end of 1984 to 67 in September 1987. Most of the listings were intended primarily to improve name recognition with Japanese investors as a means of attracting funds in other markets rather than to promote significant trading of the company's shares on the TSE. The number of foreign companies whose shares were actively traded in Tokyo was small.

Thus, compared to cross-border investment, 24-hour trading represented a more limited and specialized channel for the transmission of disturbances from one equities market to another. As a general phenomenon, it had not developed to the point where it could easily spread a stock market decline around the globe.

⁵The ISE points out that trading volumes in foreign shares are volatile. For the first six months of 1987, German and French shares accounted for 26 percent of trading value, U.S. shares, 8 percent, and Japanese shares, 21 percent

Table 3

Gross Transactions of Nonresidents on the Tokyo Stock Exchange

	Percent of Total Transactions*	Value of Transactions*†	Turnover Ratio‡
1984	15.1	15.2	116
1985	13.3	16.0	100
1986	11.5	30.2	165
1987 Jan -Sept	10.3	39.5	284

*By calendar year

†In trillions of yen

‡The turnover ratio was calculated by dividing the value of nonresidents' gross transactions for an entire calendar year by the value of their shareholdings as of March of the following year. For example, the turnover ratio for 1985 is based on gross transactions for calendar year 1985 divided by equity holdings as of March 1986. For 1987, however, the ratio was calculated by dividing gross transactions through September by equity holdings at the end of that month.

Source: Tokyo Stock Exchange

The role of linkages in the crash

Stock markets turned down sharply in mid-October in New York, Tokyo, and London, but the precise timing of the events differed among the cities in two important respects (Chart 1). First, while New York's fall began on October 14, London and Tokyo did not experience large declines until the following week. The ISE began falling slowly with New York on October 14, but a storm on Friday the 16th prevented people from getting to work, virtually closing the market. London's first large decline occurred on October 19. Tokyo did not fall sharply until October 20. Second, although a severe decline occurred in all markets on October 19 or 20, New York and Tokyo recovered somewhat while London continued to fall over the next three weeks, reaching its low on November 9. The London pattern was far more common both on the European continent and in most of the Far East outside Japan.

For the three largest equities markets, a discernible role for cross-border investment and overseas trading in equities during the market break was confined to two instances: heavy sales by nonresidents in Tokyo on October 20 and price declines in UK ADRs traded in New York around October 19. Thus, direct linkages

were not alone responsible for the rapid spread of the break to virtually all of the world's equities markets.

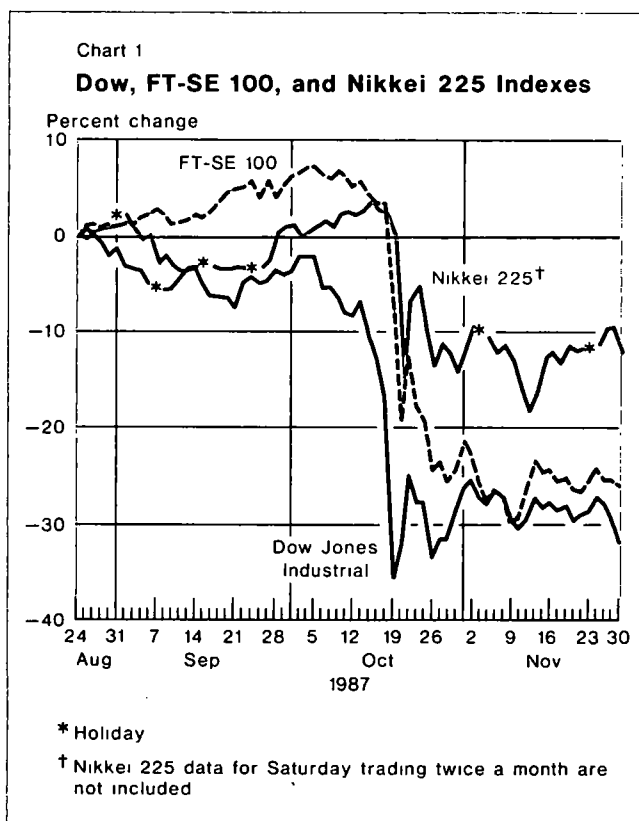
U.S. equities

Most accounts of the New York market break focus on the actions of U.S. residents and do not attribute a major role to nonresident investors. The Brady Commission report made no mention of nonresident selling in New York on October 19 or 20. The SEC staff report recorded rumors that international investors were "dumping" U.S. stocks but concluded that the volume of selling was not heavy. U.S. Treasury data also suggest that nonresident selling could not have been heavy since, on balance, nonresidents purchased U.S. stocks in October.⁶

Sales of U.S. stocks in London on October 19 by U.S. institutional investors may have played a small role by providing early indications of the strength of selling pressures to come that day. According to the SEC staff report, much of the London trading in U.S. stocks on October 19 and 20 apparently was arranged in New York and executed in London. The report attributed much of the transactions volume to U.S. prenegotiated trades crossed in London and to U.S. futures-related and other special purpose trades.

The volume of trading of U.S. equities in London, however, remained relatively small. For U.S. stocks included in the Dow Jones Industrial Average, the number of shares traded probably never exceeded 3 percent of New York share volume on any day between October 14 and October 21. In the week of October 19, the value of turnover in U.S. stocks was about normal, however, the number of deals rose sharply. From the resulting lower average transactions value, the ISE inferred that retail business assumed more importance. One explanation consistent with both the U.S. and London reports is that U.S. institutions traded in London on October 19 and 20 and withdrew for the balance of the week.⁷

The liquidity available in U.S. stocks in London apparently declined after October 19, making transactions difficult. The International Stock Exchange reported that U.S.-affiliated market makers, on orders from their head offices, did not always quote prices in the week beginning October 19. The loss of liquidity in U.S. shares was common to other foreign equities traded in London. The spread between best bid and



⁶See *The Report of the Presidential Task Force on Market Mechanisms*, January 1988, and U.S. Securities and Exchange Commission, Division of Market Regulation, *The October 1987 Market Break*, February 1988, chap. 11.

⁷The ISE report on the crash appeared in the Exchange's publication, *The Quality of Markets Quarterly*, Winter 1987-88.

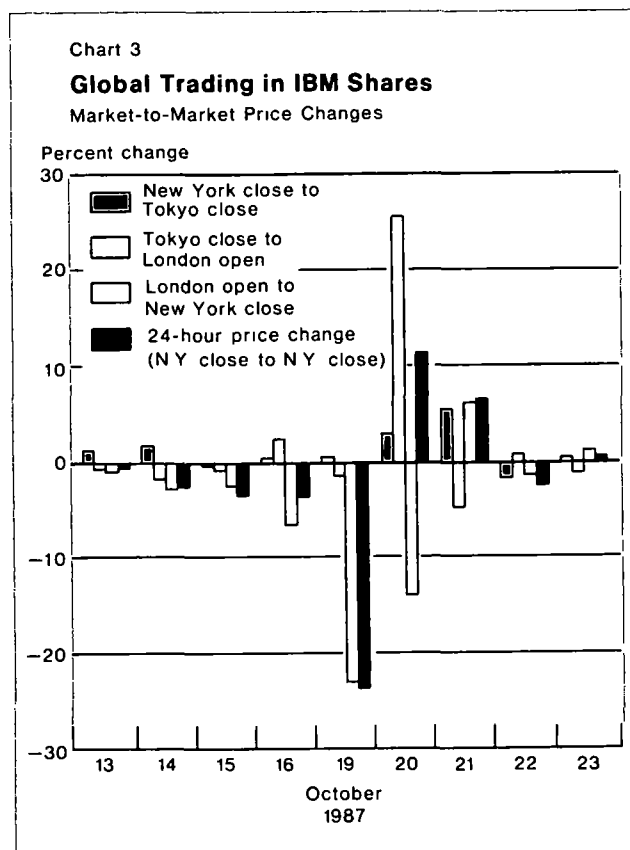
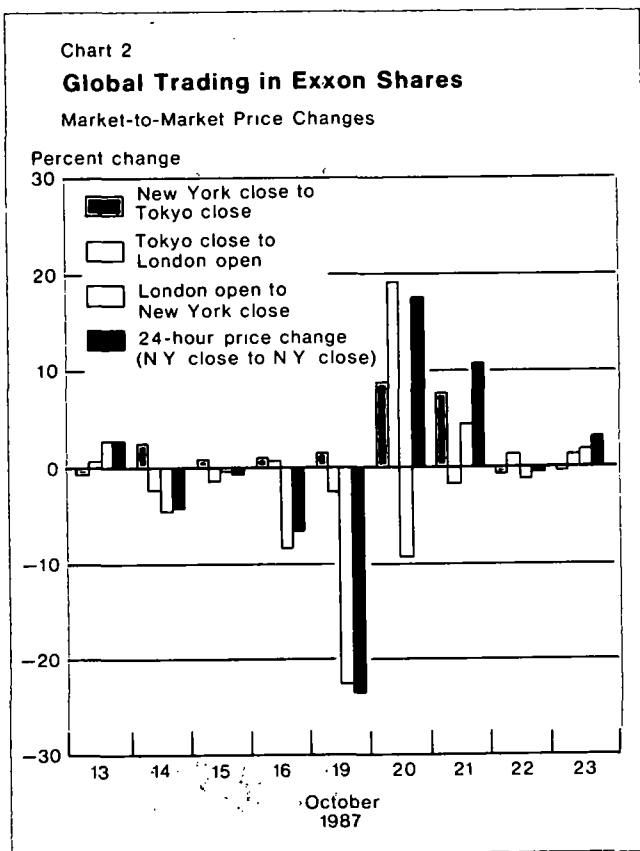
best offer (the "touch") widened. For the 200 most active foreign shares (accounting for 60 percent of foreign share volume), the touch rose from about 0.8 percent precrash, a spread about equal to that for the most liquid U.K. shares, to 1.2 percent postcrash.

Some linkage of price movements in London and New York can be observed around October 19 in two major stocks that trade 24 hours a day, IBM and Exxon. (The shares of relatively few U.S. companies traded actively around the clock at the time.) However, the overlap in trading days and the difficulties in placing or executing orders that emerged in both markets make the extent of a New York-London price cycle virtually impossible to identify. Both stocks opened roughly 1 percent to 2 percent lower in London than they had closed in Tokyo on October 14, October 15, and October 19, all days of large price declines in U.S. stocks. (Charts 2 and 3) Using London opening prices understates London's effect, since trading continues for five hours before the New York market opens.

The size of London's price decline on October 19 is probably particularly understated by using opening

prices. London prices for IBM and Exxon opened down, but the London market dropped throughout the day. New York opened roughly 10 percent below the previous day's close in both stocks; a good part of the drop may already have occurred in London. The fall in London could conceivably have accounted for as much as one-third of the total decline in the prices of these two stocks on October 19. Similarly, both stocks opened much higher in London on October 20, as they did a few hours later in New York.

In contrast, price movements in Tokyo bore little relationship to price movements later in London and New York. Trading volume in foreign shares in Tokyo, never large, declined sharply after October 19 to less than half the September average. Trading of U.S. shares in Tokyo was clearly too small to have had a significant effect on prices of U.S. stocks in London or New York. Indeed, prices of both IBM and Exxon rose most days between October 13 and October 23 in the Tokyo market, including October 19. A similar lack of correlation between Tokyo and domestic price movements can be found for other U.S. and U.K. stocks.



Japanese equities

Although nonresidents owned only about 5 percent of the Japanese market and accounted for about 10 percent of trading value, they were able to influence the October 20 downturn strongly. The October 19 declines on the New York and London exchanges heightened the fear of an impending major correction in Tokyo. That fear may have been exacerbated by the anticipated supply overhang stemming from the huge Nippon Telegraph and Telephone offering scheduled for November. These worries may have led to some price-insensitive selling by investors outside Japan.

Nonresidents placed orders to sell Japanese stock in Tokyo early on the morning of October 20. Most of these orders were "market" orders. That is, the *saitori* member who matches buy and sell orders on the exchange was instructed to sell the stock at the current price.⁸ According to TSE rules, if a buyer cannot be found at the current price, the *saitori* member drops the price a notch at about 10 minute intervals until a buyer is found. However, prices are only allowed to fall on average about 15 percent from the previous day's close. On October 20, buyers proved difficult to find and the price floors on many stocks were reached.⁹

Over the rest of the week, however, Japanese residents absorbed large amounts of shares from nonresidents who were liquidating their holdings. According to Tokyo Stock Exchange data, nonresidents sold over ¥1 trillion (\$7 billion) of stock from October 19 to October 24. Continued heavy sales the following week are reflected in Japanese balance of payments data that show nonresident sales of over \$12 billion for all of October.

The TSE bore most of the nonresident selling pressure on October 20. Few Japanese companies traded in the United States in ADR form. Trading of Japanese stocks in London was also small, although international investors made heavier use of the London market for Japanese stocks in the week of the crash. Measured in value terms, transactions in Japanese shares expanded five times. The surge occurred even though Japanese dealers were not obliged to quote prices in Japanese stocks on SEAQ on October 20, according to the ISE.

⁸Unlike a specialist on the New York Stock Exchange, the *saitori* member does not take positions in stocks

⁹Price limits did not halt trading in foreign stocks, since the limits operate differently for domestic and foreign stocks. For domestic stocks, price limits for the current trading day are calculated from the previous day's close. For foreign stocks, the TSE uses the closing price in the home or another major overseas market as its benchmark. In practice, this means that a foreign stock can drop more than 15 percent in the home market and then still drop an additional 15 percent in Tokyo. SmithKline Beckman, for example, fell 30 percent from October 19 to October 20 in Japan.

U.K. equities

While some market analysts have argued that direct sales of U.K. shares in London by nonresidents, particularly European investors, may have influenced the London crash, the behavior of domestic residents was the driving force in the decline. Some U.K. institutional investors sold heavily, while other U.K. institutions were reluctant to buy, a reflection of the unusually large equity positions they had taken on. Added to this was the overhang from the British Petroleum (BP) underwriting and from commitments to take up shares from previously scheduled U.K. company "rights" offerings. These factors prevented institutional investors from supporting the market with buying—a degree of which might have been expected otherwise—and led them to reduce heavy equity positions to make room for the new issuance coming onto their books.¹⁰

The more important international influence on U.K. stock prices was trading of top U.K. company shares in the form of ADRs. Large net sales of U.K. ADRs in the United States would have been reflected in a sharp contraction in ADRs outstanding and a net flowback of underlying registered shares into the London market. The analysis below of the 10 largest sponsored U.K. ADR programs during October and November shows that a significant withdrawal from U.K. shares in ADR form in fact occurred.

The development of a deep market for leading U.K. shares in New York, backed by the increased liquidity of the domestic U.K. equity market after Big Bang, made U.K. shares more accessible and attractive to international investors. From May to September 1987, the share turnover (adjusted for the number of ordinary shares per ADR) of the top 18 U.K. ADR programs was roughly 4 percent to 5 percent of total U.K. customer share turnover in London. The top 18 represent the bulk of U.K. ADR trading volume in New York. The top 10 U.K. ADR programs analyzed here had adjusted share trading volumes that ranged between 12 percent and 70 percent of their combined London and New York turnover in August and September 1987 (Table 4).

Differences in U.S. and U.K. investor attitudes toward U.K. shares should, at the margin, be reflected in U.K.

¹⁰Most major U.K. institutional investors were members of the subunderwriting group in the record £3.7 billion BP privatization. The subscription period ended on October 24. As in previous privatizations, the BP indenture included a "clawback" provision designed to assure maximum retail investor participation. Whenever retail subscriptions exceeded the shares set aside for those investors, shares allocated to institutions could be "clawed back" to meet retail demand. The institutions, therefore, would typically oversubscribe—sometimes by a factor of 10—to have a better chance of being allotted the number of shares desired. Consequently, in the BP offering, when retail investors failed to materialize once the sell-off in London began, institutions revised their expectations and anticipated receiving shares far in excess of the amount desired.

ADR creation or liquidation because of arbitrage between markets. Differences in attitude can reflect differing expectations about exchange rates and other variables influencing investment returns. When such differences lead to selling pressure from international investors, we would expect to find that U.K. ADRs had been broken down into their constituent shares and sold into the U.K. stock market. ADRs outstanding for individual issues, in fact, tend to ebb and flow significantly from month to month, within a range of 7 percent in either direction, according to ADR banks.

In October, the 10 ADRs studied showed large flowback on balance, followed by further flowback in November. Outstandings of 4 of the 10 U.K. ADRs fell by more than 7 percent, and those of 2 more fell between 5 percent and 7 percent in October. The variation ranged from an increase of 0.2 percent to a 14 percent contraction. Outstandings of the 10 ADRs declined by 6 percent on average when weighted by the value of ADRs outstanding at the end of July (Table 4). In November, which may have been as important as October because of the five-day settlement period for New York exchanges and the extended decline of the U.K. market, all 10 ADRs experienced flowback. Although only 1 program contracted more than 7 percent, another 4 had flowback between

4.5 percent and 7 percent. The weighted average level of flowback declined to about 4 percent, with the range spanning 0.8 percent to 9 percent. Other U.K. ADR programs showed mixed trading results over the two months, with heavy flowback reported for some and ADR creation for others.

The size of the flowback does not alter the earlier conclusion that domestic, not foreign, selling was the major trigger in the U.K. decline. In comparison with London trading volume in the days following October 19, the number of U.K. shares represented by this level of flowback was not overwhelming. Net sales of ADRs in New York, however, did bid down prices in New York, a development that may have had an important negative psychological effect in London.

To see how trading in New York may have influenced price behavior in London, changes in closing ADR prices in New York from the London close earlier that day were compared with closing price changes in London the following day. The period considered was the week before and after October 19. The results of this analysis were averaged across 10 leading U.K. companies with ADR programs and are summarized in Chart 4.

Around October 19, changes in the London prices of the 10 shares tended to reflect changes in their ADR prices in New York after London's close on the previous business day. On October 20, for example, those shares declined 14 percent in London after the ADR prices had fallen 11 percent on October 19. The price declines in New York on October 16 may have been related in part to a storm in London that brought trading there to a virtual halt, although the market was still technically open. Together, the size of flowback in October and the pattern of price changes around October 19 suggest that some significant selling pressure on U.K. stocks emanated from the ADR market in New York.¹¹

Implications for other market centers

Elsewhere in Europe and the Far East, where the foreign share of ownership and transactions was greater than in the largest markets, the effect of nonresident selling was probably more pronounced. Relatively heavy selling in some smaller markets can be seen in the bilateral flow data from some large countries. For example, U.S. residents sold substantial amounts in

¹¹Nevertheless, ADR flowback and price declines for individual shares were not closely tied in October, underscoring the point that overseas investors were not the driving force in the U.K. stock market decline. Reuters, for instance, registered a 44 percent price decline in October but showed below average flowback of 2½ percent. Shell Transport, by contrast, showed a below average price decline of 20 percent over the same period but showed heavy flowback of close to 14 percent.

Table 4

Ten Leading U.K. ADR Programs: Volume and Flowback Data*

	1987			
	Aug	Sept	Oct	Nov
Percent of total trading volume†				
Low	12.3	21.0	10.5	8.1
High	70.4	66.0	64.1	61.5
Median	42.4	43.3	29.3	29.9
Weighted-average‡	47.5	45.5	35.2	31.5
Creation/flowback (+/-) §				
Low	-8.4	-5.2	-14.3	-8.9
High	37.0	20.7	0.2	-0.8
Median	-2.0	1.5	-6.5	-4.5
Weighted-average‡	4.2	1.8	-5.9	-3.8

*Top ten sponsored U.K. ADR programs: Hanson, Glaxo, Jaguar, BP, Beecham, Saatchi, ICI, Reuters, Shell Transport, and British Gas.

†ADR ordinary share equivalent volume as a percentage of the sum of U.K. share volume and ADR ordinary share equivalent volume.

‡Weighted by the value of ADR certificates outstanding at the end of July.

§Percentage change in ADRs outstanding over the period. Flowback is defined as a decline in outstandings over the period.

Sources: S&P's *Security Owner's Stock Guide*, ADR agent banks.

some European countries and in some Asian countries (including Japan) in October.

It seems likely that the ability to trade European stocks in London somewhat accelerated the spread of the worldwide decline to other European markets, an effect that did not seem to hold for U.S. and Japanese shares. Trading of foreign equities on the ISE rose sharply during the week of the crash. In some cases—the ISE report on the October market break mentions French equities—selling pressures in London were transmitted directly to the domestic market as market makers sold in the home market the shares they had absorbed from investors in London.

Even though the direct linkages were stronger in markets other than the three largest equities markets, cross-border investment and 24-hour trading of equities probably did not create connections strong enough to explain the synchrony in the world's equities markets. Thus, the principal linkage was most likely an indirect one. In the panicky environment surrounding

the crash, market participants interpreted steep price declines in overseas markets as signals of impending declines in their own markets.

International linkages after the October break

Although cross-border selling of equities cannot explain the global spread of the crash, substantial cross-border net sales did occur in the weeks after the market break (Table 5). These sales no doubt contributed to the weak tone in worldwide stockmarkets in the last quarter of 1987. Indeed, heavy cross-border selling created fears that international investors, shaken by the October crash, were liquidating investments of all types in the major markets and repatriating funds to their home markets, a view that became known as the "homing" hypothesis.

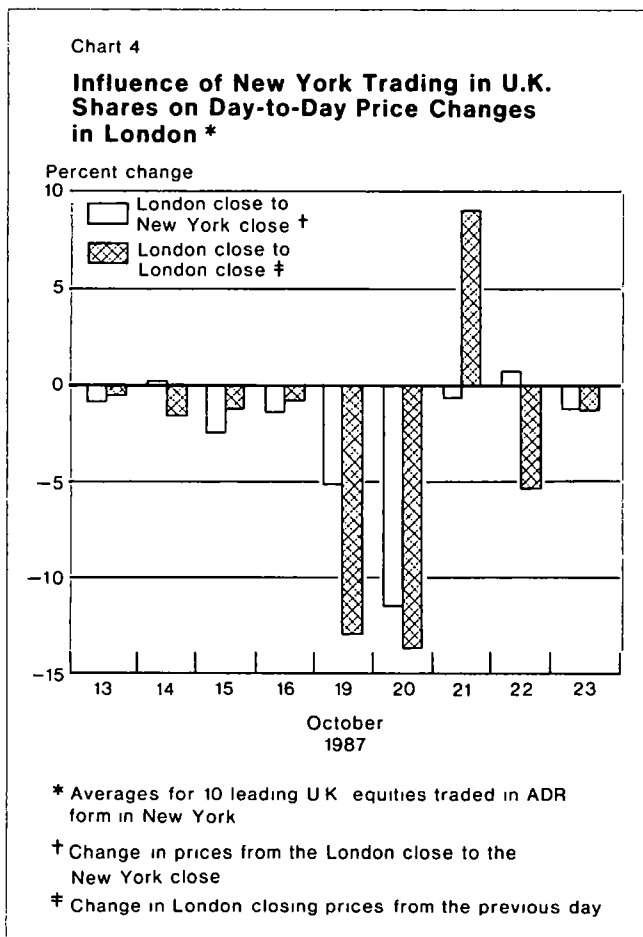
The available data suggests, however, that the pattern of cross-border transactions in the weeks after the break more closely resembled the development of flows in the U.S. securities markets than the flows envisioned by the homing hypothesis. Some investor segments clearly decided to reduce their equity investments, but others maintained their holdings. Cross-border demand for government securities picked up shortly after the crash, but a sharp temporary slowing of corporate debt issuance in the euromarkets lasted into early 1988. As a result, the banking system—and the central banks—played an increased role in international financial intermediation.

Cross-border trading after the crash

Sales by cross-border investors in the major equities markets in the weeks after the crash were substantial. After liquidating \$12 billion in Japan in October (primarily in the second half of the month), nonresidents sold another \$9 billion in November. In the United States, nonresidents, who were on balance net buyers in October, sold nearly \$7 billion in November. In Germany and, to a lesser extent, in Canada, nonresident selling continued to be heavy relative to market size in November. In total, cross-border sales amounted to \$30 billion in four markets—Canada, Germany, Japan, and the United States—in October and November.¹²

Another sign of cross-border investor withdrawal was a drop in total transactions value after October, suggesting that nonresidents not only sold stocks but traded their portfolios less actively. The value of nonresidents' gross transactions was unusually high in October in four major countries (Table 6), well above the average in the first nine months of 1987. However, the value as a share of total turnover on the major

¹²Available statistics do not indicate the scale of net sales of foreign equities in London.



stock markets did not rise above levels seen earlier in 1987. Transactions value dropped sharply in November to levels well below the monthly average for the first nine months in all markets. This broad-based slowdown in activity was accompanied by reduced trading of foreign stocks in domestic markets. Trading of foreign stocks declined sharply on the Tokyo Stock Exchange, and after a surge in October, fell close to its lows for the year in London.

The identity of the heavy sellers in the fourth quarter of 1987 is a mystery. U.K. residents accounted for as much as a third, or around \$10 billion, of the outflows in

the major markets. The United Kingdom's importance as a seller is borne out in bilateral flow data for the major markets. But the United Kingdom channels funds from many U.S. and other foreign institutional and large investors who run their international portfolios out of London.

Residents of the other four major countries for which data are available do not account for much of the sales. Of this group, U.S. residents were the only substantial net sellers, but the sales were less than \$3 billion for October and November combined. A large part of that sum appears attributable to sales by U.S.-based

Table 5

Cross-Border Equity Flows before and after the Market Break

In Billions of Dollars

	Nonresident Net Purchases*					Net Purchases of Foreign Equities*					
	1987- III	1987- IV	1988- I	1987 Oct	1987 Nov	1987- III	1987- IV	1988- I	1987 Oct	1987 Nov	
<u>Of domestic equity in</u>						<u>By residents of</u>					
Canada	1 3	-1 0	-0 6	-0 3	-0 5	Canada	-0 1	0 4	0 1	-0 3	0 1
Germany	0 8	-4 2	-0 9	-2 0	-1 4	Germany	0 4	0 6	1 9	0 6	-0 3
Japan	-8 0	-21 5	6 6	-12 4	-8 5	Japan	3 5	3 3	-0 6	2 4	0 8
United Kingdom†	5 4	3 9	-0 2	N A	N A	United Kingdom‡	1 2	-9 6	-1 0	N A	N A
United States	5 0	-7 8	-0 2	2 5	-6 7	United States	0 4	-3 9	0 7	-2 1	-0 7

*(-) = net sales

†Transactions by overseas residents in U.K. company securities, believed to be largely equities

‡Net purchases of ordinary shares of overseas companies by nonbank financial institutions

Sources: Statistics Canada, *Security Transactions with Nonresidents*, Table 3, Statistics Canada, *Quarterly Estimates of the Canadian Balance of International Payments*, Table 1, Deutsche Bundesbank, *Balance of Payments Statistics, Statistical Supplements to the Monthly Reports of the Deutsche Bundesbank*, Series 3, Table 5d, Bank of Japan, Foreign Department, *Balance of Payments Monthly*, "Long-Term Capital", Central Statistical Office (United Kingdom), *Financial Statistics*, Tables 7 1 and 8 7, U.S. Department of Commerce, *Survey of Current Business*, Tables 2, 6, and 9, Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, Table 3 24

Table 6

Cross-Border Equity Transactions Value before and after the Market Break

Sum of Gross Purchases and Sales in Billions of Dollars

	Nonresident Transactions					Transactions in Foreign Equities					
	1987- III	1987- IV	1988- I	1987 Oct	1987 Nov	1987- III	1987- IV	1988- I	1987 Oct	1987 Nov	
<u>In domestic equities in</u>						<u>By residents of</u>					
Canada	11 2	9 4	6 8	4 3	2 6	Canada	13 4	13 4	8 9	5 7	4 4
Germany	22 5	17 0	13 7	8 4	5 2	Germany	17 9	11 6	11 6	5 7	3 1
Japan	85 9	76 5	74 3	41 2	20 8	Japan	40 3	36 4	38 4	14 4	10 8
United States	136 8	122 2	95 4	58 0	34 0	United States	52 1	47 3	35 7	23 9	14 5

Sources: Statistics Canada, *Security Transactions with Nonresidents*, Table 3, Statistics Canada, *Quarterly Estimates of the Canadian Balance of International Payments*, Table 11, Deutsche Bundesbank, *Balance of Payments Statistics, Statistical Supplements to the Monthly Reports of the Deutsche Bundesbank*, Series 3, Table 5d, Bank of Japan, Foreign Department, *Balance of Payments Monthly*, "Long-Term Capital", U.S. Department of Commerce, *Survey of Current Business*, Tables 2, 6, and 9, Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, Table 3 24

mutual funds investing in foreign stocks. They sold \$2.4 billion of stocks in October and November to meet redemptions and switches out of international funds—roughly 15 percent of the assets of *all* international mutual funds at the end of 1986.

Indeed, residents of Japan, Germany, and Canada were net buyers of overseas equities in the fourth quarter of 1987. Japanese net purchases, a major force in the expansion of cross-border investment, slowed in November and December after substantial net purchases in October.

A large part of the \$20 billion balance of net sales appears to be from countries that, like the United Kingdom, traditionally channel investment from industrial and nonindustrial countries. Estimated sales from Switzerland accounted for roughly \$3 billion; from Asian centers, about \$7 billion; and from other European countries, around \$3 billion. It seems likely, then, that a significant portion of the disinvestment came from outside the G-10 countries. In Germany, for example, selling by residents of Switzerland, offshore centers, and LDCs came to roughly 40 percent of fourth quarter 1987 net sales by all nonresidents.

Investment behavior of international investors

The apparent concentration of selling from international centers calls into question the homing hypothesis that circulated in the weeks following the crash. As noted earlier, the homing hypothesis posited that international investors, alarmed by the October crash, liquidated investments of all types in the major markets and repatriated the funds to their home markets.

Two observations seem inconsistent with the homing hypothesis. First, investors in the wealthiest countries—Japan, Germany, and the United States—did not flee the international equities markets, although Japanese and German residents slowed their external investments after October and U.S. residents sold a relatively small portion of holdings. Residents of these countries had played an important role in the surge in cross-border equity investment, accounting for a \$26 billion increase in net cross-border equity investments from the end of 1985 to September 1987.

These investors could have most easily repatriated any proceeds from sales of their overseas assets. In contrast, residents outside the G-10 countries who sold equities would have had more limited domestic investment opportunities and are more likely to have reinvested their funds with international banks or in the international markets.

Second, the pattern of cross-border investments in the fourth quarter of 1987 resembles the flows in U.S. domestic markets more than the withdrawal and repatriation of funds posited by the homing hypothesis.

In the international as in the U.S. securities markets, investors responded to the October break with caution. Some investors sharply reduced their equity portfolios. Many investors sought out the relative safety of the government bond markets. Cross-border investment in the major domestic bond markets—chiefly in government bonds—recovered sharply in November after net sales in October, when rapidly rising interest rates promoted a shift to shorter-term investments. On balance, nonresident bond purchases outweighed sales in the fourth quarter in the five major countries examined (Table 7). Issuance of eurobonds by Japanese and U.S. borrowers—mainly corporations—slowed abruptly after the crash, however, as did corporate bond issuance in the United States, which in November and December fell by more than a third from its monthly average in 1987.

The international banking system therefore intermediated a larger share of cross-border financial flows than it had in recent quarters. The net eurocurrency liabilities of BIS reporting banks, a group that includes most banks in industrial countries and many offshore centers, grew \$28 billion in the fourth quarter of 1987, net of exchange rate changes, compared to \$6 billion in the fourth quarter of 1986 (Table 7). In the balance of payments accounts, bank inflows were initially the major offset to the large outflows resulting from nonresident sales of equities recorded in Japan and Germany. The banking sector was also a heavy net cross-border lender to nonbanks in the fourth quarter, lending \$23 billion net, twice as much as in any other quarter in the last two years. No doubt, the higher lending reflected the slowdown in the international securities markets.¹³

Capital flows were sufficiently disrupted and exchange rate expectations sufficiently changed in the weeks after the crash that central bank reserve flows also became an important channel for international capital flows. These reserve flows assisted directly—and indirectly through the banking system—in financing the U.S. current account deficit in the fourth quarter of 1987.

Cross-border portfolio investment by residents of the large industrial countries picked up strongly in early 1988, and even investments in equities began to improve late in the first quarter. Indeed, international investors on balance bought \$7 billion in Japanese equities in the first quarter of 1988, the first net purchases in two years. Japanese and U.K. residents, however, did not participate in the resumption of cross-

¹³U.S. bank lending to nonfinancial corporate borrowers also increased in the fourth quarter but was not out of line with the experience in the fourth quarter of previous years, when financial flows were greatly affected by tax law changes.

border equity purchases in the first quarter. And trading of stocks outside the home market recovered even less in the first months of 1988. The value of foreign equities trading in London recovered to its year-earlier level but remained well below the mid-1987 peak.

Trading of leading U.K. ADRs in New York and of foreign stocks in Tokyo was still at half the year-earlier levels.

Conclusion

Cross-border investment and 24-hour trading cannot explain the rapid worldwide spread of the stock market break in October 1987. Direct linkages among the three largest equities markets—New York, Tokyo, and London—played a role in two instances. Selling by investors outside Japan in response to the declines in London and New York appears to have helped precipitate the Tokyo decline. New York's drop and recovery were transmitted fairly quickly into the prices of leading U.K. shares traded in ADR form in New York, although the principal downward push in London came from domestic investors.

The international linkages among the three largest equities markets were not sufficiently developed to produce the simultaneous and severe downturn in stock prices worldwide, and many large international investors, particularly those in Japan, did not sell off. Domestic investors shaped the decline in the largest markets. Thus, the principal international linkage between national stock markets appears to be the unobservable and indirect one created when sharp price declines in overseas markets contribute to a panicky market psychology.

The significance and the potential force of the international transmission of disturbances are likely to grow. Even after the nonresident liquidations in October and November, the stock of cross-border equity holdings is substantial. Information links among markets are already extraordinarily good and, in the area of direct trading and clearing linkages, the connections are now in the early stages of development. At present, trading links exist between Canadian and regional U.S. exchanges. Although clearing links do not yet exist with Tokyo, they are being developed between London and New York. In time, the completion of these links and a streamlining of the international clearing and settlement mechanism for internationally-traded equities could allow price discovery to occur outside the home market time zone and thus accelerate the reaction of domestic equities prices to foreign disturbances. A hint of this potential can be seen in the large increase in the trading volume of foreign equities in London—including Japanese and European shares—during the break. The shifting of European equities trading to London with clearing through Euroclear or Cedel represents the type of mechanism that could strengthen those international linkages.

The still relatively underdeveloped state of international equities trading reflects the many practical diffi-

Table 7

Selected Flows from the Balance of Payments*

Billions of Dollars Not Seasonally Adjusted, (-) = Outflow

	1987-III	1987-IV	1988-I
Nonresident portfolio investment			
Bonds			
Canada	2 0	0 7	2 7
Germany	-0 3	0 4	1 4
Japan	6 2	2 3	-1 2
United Kingdom†	3 9	0 9	0 6
United States	-2 4	1 1	6 2
Eurobonds			
Japan	14 0	5 6	8 1
United States	6 3	3 3	2 6
Resident portfolio investment abroad			
Bonds			
Canada	-0 2	0 4	-0 4
Germany	4 7	0 5	8 0
Japan‡	17 1	7 3	13 2
United Kingdom	-2 0	-5 8	5 7
United States	1 4	5 7	3 8
Net bank flows§			
Canada	0 3	1 6	1 5
Germany	3 9	3 4	2 2
Japan	-12 2	24 0	2 9
United Kingdom	-6 1	-3 3	10 0
United States	22 7	13 1	-6 7
BIS reporting area	15 9	27 9	7 4
Foreign currency reserves; (-) = increase			
Canada	-1 1	-0 6	-4 4
Germany	-1 5	-15 6	5 8
Japan	-2 8	-8 9	-3 2
United Kingdom	-0 5	-12 7	0 3
United States	-0 1	0 9	2 6

*For the United States, transactions with foreign official institutions are excluded

†Government bonds only

‡Excluding bonds issued by nonresidents in Japan

§Adjusted for exchange rates

Sources: Statistics Canada, *Quarterly Estimates of the Canadian Balance of International Payments*, Table 1, Deutsche Bundesbank, *Balance of Payments Statistics, Statistical Supplements to the Monthly Reports of the Deutsche Bundesbank*, Series 3, Table 5d, Bank of Japan, *Economic Statistics Monthly*, "Foreign and Overseas Investments in Securities", Central Statistical Office (United Kingdom), *Financial Statistics*, Tables 3 5, 7 1, and 8 7, U.S. Department of Commerce, *Survey of Current Business*, Tables 2, 6, and 9, Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, Table 3 24, Bank for International Settlements, *International Banking and Financial Market Developments*, August 1988, International Monetary Fund, *International Financial Statistics*

culties to be overcome in establishing trading and clearing links among markets. The presence of practical problems suggests that implementation of proposed measures to reduce the chance of another U.S. market break would not quickly and easily drive U.S. equities trading to offshore markets. And in an international context, reducing the chance of a market crash in the large U.S. market—or any other large market—would

work to prevent the cycle of round-the-globe panic selling seen last October.

Robert Aderhold
Christine Cumming
Alison Harwood