Two Mysterious Crashes

Black Monday

U.S. stock prices rose 33% in the first 9 months of 1987, but then they began to slip as worries about the economic outlook increased. A global rise in interest rates, a growing U.S. trade deficit, and a decline in the value of the dollar were heightening concerns about inflation and the need for higher interest rates in the U.S. as well. During the first two weeks of October the Standard & Poor's Composite Index dropped back 14%.

On Monday, October 19th there were widespread falls in foreign stock prices. In Asia prices in Hong Kong fell by 11.1%; in Europe the London Financial Times index fell by 10.1%. These falls did little to help the nerves of U.S. investors. A huge volume of selling orders in some large U.S. stocks delayed the opening of the New York Stock Exchange by up to 2 hours. Prices fell rapidly and by the close the index had fallen by 20.5% in just the one day, a move of some 20 standard deviations. Over 600 million shares were traded on the New York Stock Exchange that day, over three times the daily average for 1987. The VIX measure of the annualized volatility of NYSE stocks touched a high of 172.8%.

There had been no major item of news that weekend that could explain such a sudden sell-off. Everybody, therefore, started to search for the guilty parties. As in most murder mysteries, the immediate suspects are not the ones "who done it." The first group of suspects included "index arbitrageurs," who trade back and forth between index futures and the stocks comprising the index, taking advantage of any price discrepancies. On Black Monday futures prices fell first and fastest because investors found it easier to bail out of the stock market by way of futures than by selling individual stocks. This pushed the futures price below its correct relation with the index. Then the arbitrageurs tried to make money by selling stocks and buying the futures, but they found it difficult to get up-to-date quotes on the stocks they wished to trade. Thus the futures and the stock markets were for a time disconnected. Arbitrageurs contributed to the trading volume that swamped the New York Stock Exchange, but they did not cause the crash -- they were the messengers who tried to transmit the selling pressure in futures markets back to the exchange.

The second suspects were large institutional investors who were trying to implement portfolio insurance schemes. Portfolio insurance aims to put a floor on the value of an equity portfolio by progressively selling stocks and buying safe short-term debt securities as stock prices fall. However,

investors had not consciously sold this insurance or agreed on a price for it.[1] When they were called on to provide it, they were not prepared to do so cheaply. As the selling pressure drove prices down on Black Monday portfolio insurers were obliged to sell even more, creating a feedback effect. The sales were largely executed in the index futures market rather than in the less liquid spot market and involved an estimated $6 billion of sales on October 19. One institutional investor sold stocks and futures totalling $1.7 billion.[2] Thus the immediate cause of the price fall on Black Monday may have been a herd of elephants all trying to leave by the same exit.

Perhaps some large portfolio insurers can be convicted of disorderly conduct, but while sales by portfolio insurers in October 1987 were large in absolute terms, they nevertheless amounted only to about 0.2% of the value of U.S. equities, roughly equivalent to a large IPO. Most estimates of price elasticities for stocks would suggest that this volume could have been absorbed by the market with negligible price impact. And if portfolio insurers were the main culprits, why did stock prices fall *worldwide* -- see the following table – when portfolio insurance was significant only in the United States? Moreover, if sales were triggered mainly by portfolio insurance or trading tactics, they should have conveyed little fundamental information and prices should have bounced back after Black Monday's confusion had dissipated. They didn't.

Percentage changes in stock price indexes in October 1987 (changes measured in U.S. dollars).

Country	Change in index	Country	Change in index
Australia	-44.9%	Malaysia	-39.3%
Austria	-5.8	Mexico	-37.6
Belgium	-18.9	Netherlands	-18.1
Canada	-22.9	New Zealand	-36.0
Denmark	-7.3	Norway	-28.8
France	-19.5	Singapore	-41.6
Germany	-17.1	South Africa	-29.0
Hong Kong	-45.8	Spain	-23.1
Ireland	-25.4	Sweden	-18.6
Italy	-12.9	Switzerland	-20.8

[1] LOR, the principal provider of insurance services, had actually contemplated placing an advertisement in the Wall Street Journal drawing attention to the amount of sales to which they were potentially committed. If investors had been aware of this and therefore of the costs of implementing insurance, they might well have been more reluctant to take out insurance.

[2] In 1987 there was insufficient volume in index put options for investors to use them to place a floor on the value of their portfolios. Portfolio insurers therefore aimed to sell stocks so as to replicate a put option. The drawback was that investors were unaware of the volume of selling that was likely if prices started to fall.

Japan	-7.7	UK	-22.1
		USA	-21.6
Source: R.Roll, "The International Crash of October 1987," in R. Kamphis (ed.), *Black Monday and the Future of Financial Markets*, Richard D. Irwin Inc., Homewood, Ill., 1989. See table 1, p.37.			

The Flash Crash

On the morning of Monday May 6th 2010 the Dow Jones Average drifted down about 300 points (or 3%) on worries about the Greek debt crisis. At 2:42 p.m. the index suddenly dropped a further 600 points (or 6%) in 5 minutes. Twenty minutes later the market had regained most of that 600 point fall. The decline resulted in dramatic falls in the prices of some large stocks and in the prices of options. For example, at 2:40 p.m. Accenture's stock was trading at $41.01 a share. But in just 10 seconds 10,400 shares traded at unusually low prices, including 19 trades of 100 shares each at one cent a share. One hedge fund lost several million dollars when the price of options that it was buying spiked from 90 cents to $30 a contract.

The causes of the crash remain unclear. There were some relatively large sales of index futures by fundamental investors, and a subsequent joint SEC and CFTC study pointed the finger at a large mutual fund that initiated a program to sell $4.1 billion of index futures. The sales of index futures were initially absorbed by high-frequency traders who then resold them. The result was a hot-potato effect as the same positions were rapidly passed back and forth. The fall in futures prices was transmitted to the equity markets by arbitrageurs who bought the futures and sold the underlying securities. The upheaval ended only when fundamental investors had the chance to assess the situation and to place buy orders.

In contrast to October 1987 when investors undertook a lasting reassessment of share values, the flash crash represented a short-lived failure of the market to cope with a large volume of orders from high-frequency traders