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Stock Market Volatility: Reading the Meter

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Stock market volatility, a barometer of uncertainty or risk, measures the size and frequency of fluctuations in a broad stock market price index. Usually, volatility is gauged by the standard deviation of price changes at fixed intervals in a given period. That is, volatility is low if price changes are clustered near their mean and is high if price changes are widely dispersed. In practice, we can either (i) estimate *realized volatility* using historical price index data or (ii) derive *implied volatility* from, for example, prices of options on Standard and Poor's 100 index traded on the Chicago Board Options Exchange. Because index options were not traded until the early 1980s, and thus have a relatively short history, I illustrate here the evolution of realized stock market volatility.

The accompanying Figure plots the quarterly standard deviation of daily changes in the Standard & Poor's 500 index for the period 1950:Q1 to 2001:Q4. (Shaded bars indicate recessions dated by the National Bureau of Economic Research.) As shown, stock market volatility displays a strong countercyclical pattern—peaking just before or during recessions and falling sharply late in recessions or early in recovery periods. Moreover, recent research by Campbell et al. (2001) finds that stock market volatility has significant forecasting power for real gross domestic product (GDP) growth.[1] These results are not a surprise. When volatility increases, investors require a higher risk premium to hold stocks. As a result, stock prices fall and the cost of capital rises, which in turn reduces investment and output. The Figure also shows that volatility fluctuates greatly in the short run; in particular, it rises dramatically during financial crises such as the 1987 stock market crash and other periods of uncertainty such as the Cuban missile crisis in 1962. The movement in volatility is somewhat persistent: once volatility rises, it usually stays at high levels for a while. However, volatility shows no apparent long-run trend in the post-World War II sample; it tends to return eventually to an average level.

After declining in the early 1990s, volatility started to rise in 1996 and since then has remained at remarkably high levels by postwar standards. Although unusual, the prolonged period of high volatility appears to be the result of a string of specific events. The East Asian crisis and the Russian bond default ignited financial market turmoil in 1997 and 1998, which persisted through 1999. Stock market volatility rose again in 2000 and 2001, and stock prices fell, when analysts began to forecast an end to the long economic expansion. Given its historical pattern, volatility is likely to decline and return to its normal level when the recession comes to an end. Interestingly, stock market volatility took a large dip in the fourth quarter of 2001, which might be a sign that the economy is recovering from the recession. ■

[1]Campbell, John; Lettau, Martin; Malkiel, Burton and Xu, Yexiao. "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk." *Journal of Finance*, February 2001, *56*(1), pp. 1-43.

Realized Stock Market Volatility