

March 29, 2009

STRATEGIES

## Now the Long Run Looks Riskier, Too

By MARK HULBERT

CAN investors count on the stock market to produce handsome long-term returns?

The conventional answer has been, emphatically, yes. After all, despite downturns like the one we've endured recently, [stocks](#) over periods of 30 or more years have almost always outperformed other asset classes. And numerous studies have found that the stock market's long-term returns have tended to fall within a surprisingly narrow range.

But those studies were based on the stock market's past performance, which, famously, provides no guarantee of future performance. New research, using different statistical techniques aimed at capturing the uncertainty of future returns, suggests that the market may be much riskier than many investors have understood.

The new study, which began circulating last month as a working paper, is titled "Are Stocks Really Less Volatile in the Long Run?" Its authors are Lubos Pastor, a finance professor at the [University of Chicago Booth School of Business](#), and Robert F. Stambaugh, a finance professor at the Wharton School of the University of Pennsylvania. A copy is at <http://ssrn.com/abstract=1136847>.

The professors don't disagree that, historically, the stock market's returns over various 30-year periods have been surprisingly consistent. Periods of particularly good returns have been followed by subpar ones, and vice versa — a process that statisticians call reversion to the mean. Prof. Jeremy Siegel, also of Wharton, and the author of "Stocks for the Long Run," is often credited with demonstrating that mean reversion has been at work in the American stock market since 1802.

In an interview, Professor Stambaugh said that while Professor Siegel's research shows that mean reversion is powerful, it is hardly the only force affecting the stock market's long-term returns. Because estimates of those other forces are imprecise, Professor Stambaugh said, uncertainty about market fluctuations increases with the holding period — the opposite of what happens because of mean reversion.

One example of such a force, Professor Stambaugh said, is [global warming](#). Its impact on the economy over the next 12 months is likely to be quite small, he said. But expand the horizon to the next several decades, and the possible effects of global warming range from negligible to catastrophic.

It is one thing to acknowledge the existence of uncertainty, but quite another to measure its influence on long-term market volatility. To do that, Professors Pastor and Stambaugh rely on a statistical approach pioneered by the Rev. Thomas Bayes, an 18th-century English mathematician. Bayesian analysis is often used to assess the uncertainty of future outcomes, based on a formula for updating the probabilities of

given events in light of new evidence. This approach is quite different from traditional statistical measurements of probabilities based on historical data.

Applying Bayesian techniques, the professors found that reversion to the mean isn't powerful enough to overcome the growing uncertainty caused by other factors as the holding period grows. Specifically, they estimated that the volatility of stock market returns at the 30-year horizon is nearly one and a half times the volatility at the one-year horizon.

Why don't traditional measures of volatility, such as standard deviation, pick up this phenomenon? Those measures focus only on how much the stock market's shorter-term returns fluctuate around the long-term average, Professor Stambaugh says.

As a result, they ignore uncertainty about what the average return might itself turn out to be. For example, he said, it is possible that the standard deviation of the market's returns over the next 30 years could end up the same whether its average annual return over that period is 20 percent or zero.

What about Professor Siegel's finding that the stock market has produced an annual average inflation-adjusted return of close to 7 percent since 1802? In an interview, Professor Pastor emphasized that the last two centuries could easily have been less hospitable to the United States, most likely lowering the stock market's returns. An investor couldn't have known in advance that the United States would win two world wars, for example, or emerge victorious from the cold war. In any case, he said, there is no guarantee that the next two centuries will be as kind to the domestic equity market as the last two.

IN an e-mail message, Professor Siegel acknowledged the theoretical uncertainty of forecasting stock market returns, but said it was hard to quantify it. He said the methods that Professors Pastor and Stambaugh used to measure the uncertainty were "very much outside of the standard statistical techniques."

But Professor Pastor says that these methods are better suited than the standard techniques for quantifying the uncertainty faced by real-world investors. Even if Bayesian approaches have yet to become mainstream in financial research, he adds, they have become much more widely used in recent years.

What is the [investment](#) implication of the new study? Other things being equal, Professor Stambaugh says, you would probably lower your portfolio allocation to stocks. But by how much? It's impossible to generalize, since the answer depends on your time horizon and what else is in your portfolio.

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