Volatility: Returns Down the Drain

Why risk matters for performance

In brief

- Volatility diminishes the rate at which an investment grows over the long term and has a negative relative impact on portfolio returns.
- The actual compounded rate of return on an investment is less than the average rate of return by about half of the portfolio variance or risk.
- “Variance drain” points to the importance of active risk management of investment portfolios.

Compound interest is the eighth wonder of the world.
He who understands it, earns it... he who doesn’t, pays it.
— Albert Einstein

Managing risk is a key consideration for investors today. It is important not just because of potential future market declines, but also because volatility diminishes the rate at which an investment grows over the long term. In this sense, volatility has a measurable mathematical impact on returns because of its effect on compounding.

Compound returns allow one to generate earnings on an asset’s reinvested earnings and, over time, benefit from the asset growth that ensues. When high-volatility stocks experience periods of lower or negative relative returns, the potential asset growth that would otherwise accrue based on compounding is inhibited. When two portfolios with the same average return are compared, the one with the greater volatility, or variance, all other things being equal, will have a lower compound return.

For example, if Portfolio A earns a 10% return in two consecutive years, it will have a mean return of 10% per year. Contrast this with Portfolio B, which earns a return of 30% in the first year and minus 10% in the second year, also posting a mean return of 10% per year. While the mean returns are the same, the compound rate of return will differ. Portfolio A earns a rate of return of 10% while Portfolio B earns only 8.2%. This difference is known as variance drain or volatility drag, which can be described as the negative relative impact volatility has on portfolio returns.

Another example further illustrates this effect. Suppose an investor has a $100,000 portfolio that experiences a minus 15% return this month and a 15% rebound next month. While the average return is zero, the painful math is that the portfolio went down to $85,000 with the 15% drop and then rebounded to $97,750 with the 15% rebound. The $2,250 loss incurred is the volatility drag.
The theoretical basis of volatility drain was explained in 1995 by James MacBeth, who estimated that actual compounded return is less than the average return by about half of the portfolio variance or risk (when variance is defined as the squared standard deviation of returns). Tom Messmore published a paper the same year titled, “Variance Drain: Is Your Investment Return Leaking Down the Variance Drain?” which also explains the important distinction between mean or average return and compounded return over time.

Messmore shows that variance drain can have a very substantial impact on investment returns, concluding that a “meaningful reduction of variance drain would represent a substantial move up in any ranked list of investment manager performance using realized long-term investment results.”

Variance drain is illustrated in Exhibit 1 in the comparison of a biopharmaceutical company, Stock 1, and a global consumer company, Stock 2. While stock #1 had average returns that were ninety six basis points higher than stock #2, the higher volatility of stock #1 led to it posting lower compound returns and a lower Sharpe Ratio over the same period of time.

The very real effects of variance drain point to the importance of active risk management of investment portfolios. In particular, they suggest that a portfolio manager should reduce or minimize period-to-period return variability, while seeking to hold average returns unchanged. This requires that a manager pay close attention to portfolio risk measurement and have appropriate policies and procedures in place, along with a risk-aware culture, to actively manage the risk embedded in a portfolio.

While the “animal spirits” to which Keynes famously attributed investment fluctuations are by definition almost impossible to predict or reliably fathom, it is possible to have insight into the nature of the risk of an investment portfolio — and actively manage this risk.

Exhibit 1: A tale of two stocks: Compound returns fall short of average returns due to volatility effect

Source: Source: FactSet. Daily returns as of 3 January 2006 to 31 December 2018, with the stock levels rebased to 100 on 30 December 2005. Total compound returns include the reinvestment of dividends on the exdate. Returns are calculated in US dollars. Analysis based on total returns, annualized standard deviation and compound annual growth rate (CAGR). Securities mentioned are for illustrative purposes only, and are not meant as a recommendation to buy or sell the securities. Standard deviation is an indicator of return volatility. The larger the stock’s standard deviation, the greater the volatility. Sharpe Ratio is a risk-adjusted measure calculated to determine reward per unit of risk.
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Endnotes


3 Animal spirits is the term John Maynard Keynes used in his 1936 book “The General Theory of Employment, Interest and Money” to describe the instincts, proclivities and emotions that ostensibly influence and guide human behavior.