

Investment Math

How volatility compromises return.

Many investors concentrate on annual and average return when evaluating portfolio performance. While these calculations are important and useful for analysis, they provide only part of the big picture. Volatility affects performance as well.

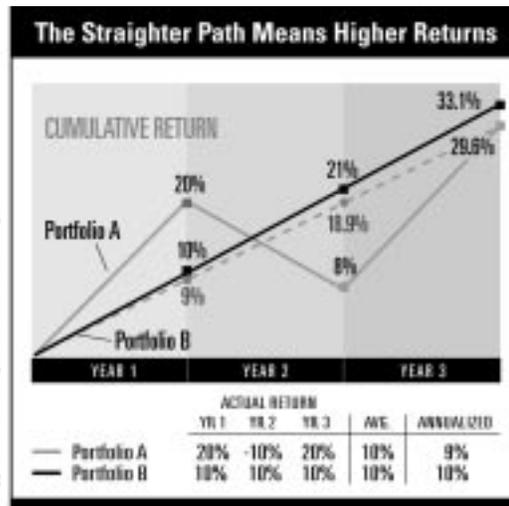
Volatility is the degree to which a portfolio's return varies over time. Most people don't grasp the link between volatility and long-term performance. But it is a strong link and a relationship worth understanding. This is true in every type of market. Investors who don't structure their portfolio to reduce volatility often make mistakes that ruin their chances to build wealth and security.

To understand the impact of volatility, let's consider a few relevant principles of investment math:

■ **Rule 1: Any percentage loss requires a larger percentage gain for recovery.** When people experience a loss, they naturally think about the return necessary to earn it back. But in percentage terms, the road to recovery is longer than the road to loss. For every percent loss level, a larger percent gain is required to return the portfolio to its original value. For instance, if your \$100,000 portfolio loses 10%, it must subsequently earn about 11.1% to fully recover. Look at this another way: A 10% loss reduces your portfolio to \$90,000, but a 10% rebound lifts the portfolio to only \$99,000. You need an 11.1% increase to reach \$100,000.

■ **Rule 2: The percentage gain needed for recovery grows exponentially as the percent loss increases.** Many investors understand the power of compounded growth. But the principle can work against you as well. The return needed to recoup a loss grows disproportionately higher as the loss increases. This is because you have less money working for you after the drop. For instance, the 10% drop requires an 11.1% rebound; a 25% loss requires a 33.3% rebound; a 50% loss requires a 100% return; and a 75% loss needs a 400% rebound to return a portfolio to its original level. This principal shocked technology investors who lost an average 70.1% between the market's peak in March 2000 and April 2001. ⁽¹⁾

■ **Rule 3: Higher volatility drags down performance.** The more a portfolio's return varies, the greater the impact on its total and annualized return. If you could choose between two portfolios with the same average return, the one with the lower volatility would be preferred. The more stable a portfolio's return, the higher



Hypothetical example. For illustration only.

the compounding rate and annualized return will be over time.

The adjacent chart demonstrates this principle by illustrating the results of two hypothetical investments having the same 10% average annual return over three years. Portfolio A experiences actual returns of 20%, -10% and 20%, while Portfolio B earns a steady 10% each year. Although both portfolios average 10% annually, Portfolio A's fluctuation translates into a lower cumulative return (29.6% vs. 33.1%). As a result, Portfolio A has a 9% annualized return and Portfolio B a 10% annualized return. (Annualized return is the percent value required to reach the cumulative return over the three-year span.)

Volatility is why these portfolios have different cumulative returns but the same average annual return. Portfolio A's cumulative return line rises and dips along its bumpy three-year course (20%, 8% and 29.6%). Consequently, its annualized rate produces a lower return (9%, 18.9% and 29.6%), which is plotted along the dashed line. Portfolio B's higher slope (solid line) reflects its 10% annualized and average return.

The lesson

If volatility is such a dominating force in wealth accumulation, investors should structure their holdings to reduce return variation over different periods. The primary tool is through more sophisticated diversification strategies. By holding a sufficient number of securities within each asset group—and several asset groups that don't perform the same way in a given market environment—we attempt to smooth out the effects of market volatility over time.

With this in mind, we consider portfolio stabilization as more than a defensive technique. It's also a tool to enhance return. You cannot eliminate volatility in the real world. But you can reduce the frequency and magnitude of return fluctuation through portfolio design. A prudent strategy will concentrate on all the forces that impact wealth accumulation.

Here's a summary of the various return measurements featured in the portfolio illustration on the chart:

Actual return reflects the return experienced each year over the three-year period. Portfolio A returned 20%, -10% and 20%, respectively, while Portfolio B consistently earned 10% each year.

Cumulative return measures aggregate performance over the period. It factors in the compounding effect of actual return each year. Portfolio A's total return is 20%, 8%, and 29.6% in years 1, 2 and 3, respectively. Portfolio B's cumulative return is 10%, 21% and 33.1%.

Average return shows how the portfolios performed "on average" each year. Portfolio A and B both have an average return of 10% per year. But this average doesn't reveal that Portfolio A's yearly returns were volatile and Portfolio B's were not.

Annualized return reflects the annual fixed percent value necessary to produce the portfolio's cumulative return for the three-year period. It gives a more descriptive view of how volatility has impacted performance. Portfolio A's annualized return is 9% (reflected in the dashed line), while Portfolio B's is 10% (solid line).

⁽¹⁾ "Doing the Math: Tech Investors' Road to Recovery is Long", Wall Street Journal, May 18, 2001, p C1.

