



# Financial Fables

## Variance Drain

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Harry Markowitz, the father of Modern Portfolio Theory, realized what distinguishes an efficient portfolio from an inefficient one is the degree to which the individual parts of the portfolio are correlated. It is the strength and direction of the relationship between the returns of different securities, not merely the number of securities held that provides the risk-reducing benefits of diversification. Markowitz's basic assumption was that risk is measured by variance. Variance is a measure of portfolio volatility (the average deviation from the mean.) Variance drain is the mathematical explanation as to why two portfolios with same average return but different variances will have different compounded rates of return. The one with the greater variance will have a lower compounded rate of return. Therefore, an efficiently diversified portfolio, the one with the smaller variance, has a higher probability of producing wealth over time, even though in any given time period the inefficiently diversified portfolio may have a higher expected return.

The following example shows how variance drain can, unexpectedly, penalize those that attempt to maximize portfolio return:

Assume that a portfolio starts with \$100 and makes 50% in year one and loses 50% in year two. At the end of the first year the portfolio value is worth \$150 ( $\$100 \times 1.5$ ), but drops to \$75 ( $\$150 \times 0.5$ ) by the end of the second year. The portfolio made 50% and the next year lost 50%. The average return was 0%, but the portfolio dropped in value by 25%. If the annual volatility was half as much, up 25% and down 25%, the portfolio would grow to \$125 in year 1 ( $\$100 \times 1.25$ ) and drop to \$93.75 in year 2 ( $\$125 \times 0.75$ ), the loss would be only 6 ¼%, not 12 ½%.

The lesson to learn from this example is that losses have a bigger impact on a portfolio than gains and big losses have a significantly larger impact than big gains.

Because of variance drain, constructing portfolios by selecting securities with the highest expected returns, instead of low correlation of returns, reduces the long term expected return, even though in the short term the expected return may be higher. Therefore, it is an interesting phenomenon that investment advisors who attempt to maximize returns during any given time period may actually be decreasing the probability of long term success for their clients.