

---

# Risk is Not The Same as Volatility

By Michael Keppler

This is a translation (with minor changes and corrections) from the German original that was published in *Die Bank*, November 1990, Number 11, pp. 610-614.

Founded in 1961, *Die Bank* is a journal for the Banking Industry and is published monthly by Bank-Verlag GmbH, Cologne. Bank-Verlag is a subsidiary of Bundesverband deutscher Banken [Association of German Banks], an organization for private commercial banks in Germany.

---

On December 10, Harry Markowitz and his disciple, William Sharpe, both Americans, will be awarded the Nobel Prize in Economics. They are the founders of Modern Portfolio Theory, which, as a result of the prize, stands to gain greater influence in the world of portfolio management. Michael Keppler, First Vice President of Commerzbank Capital Markets, New York, views this prospect with concern and strikes a note of warning. He questions the use of volatility as a proxy for risk from a practitioner's point of view and offers instead more meaningful ways of measuring risk.

---

If you ask investors what risk they assume when buying stocks, they likely will respond, "Losing money." Modern portfolio theorists do not, however, define risk as a likelihood of loss, but as volatility, which is determined using statistical measures of variance such as standard deviation and beta. While standard deviation is a measure of absolute volatility that shows how much an investment's return varies from its average return over time, beta is a measure of relative volatility that indicates the price variance of an investment compared to the market as a whole. The higher the standard deviation or beta, the higher the risk, according to the theory. In a rising market, however, high volatility can boost the return potential of an investment. Volatility, in other words, is essentially a double-edged sword, and does not measure what an investor intuitively perceives as risk.

Suppose the price of a stock goes up 10 percent in one month, 5 percent the next, and 15 percent in the third month. The standard deviation would be five with a return of 32.8 percent. Compare this to a stock that declines 15 percent three months in a row. The standard deviation would be zero with a loss of 38.6 percent. An investor holding the falling stock might find solace knowing that the loss was incurred completely "risk-free."

If we accept that risk is not the same as volatility, however, we must also question any portfolio strategy that relies on this view. Portfolio Selection Theory (developed by Markowitz) and CAPM (Capital Asset Pricing Model, developed by Sharpe based on the theory of market equilibrium) both assume a positive correlation between risk (defined as volatility) and return. Using this logic, higher expected returns can only occur with

correspondingly higher risk; and investors who seek to lower their risk levels must reduce their return expectations accordingly.

This assumption is the platform upon which modern portfolio theorists are building “optimal portfolios” using intricate mathematical models intended to maximize returns at a given level of risk or minimize risk at an expected level of return.<sup>1</sup>

Even though the Markowitz/Sharpe approach relies on unrealistic assumptions,<sup>2</sup> some observers are celebrating its wide acceptance among European asset managers since the mid-80’s as a sort of belated validation of a (supposedly brilliant) idea<sup>3</sup> hatched in the US back in the 1950s and 60s. Endorsing the founders of MPT with a Nobel Prize in Economics will likely support this view.

The important contributions that Markowitz and Sharpe made as pioneers in Capital Market Theory should not blind practitioners to the shortcomings of CAPM, which is of limited practical use, and, as critics in the US have noted, often leads to “dissatisfied clients.”<sup>4</sup> Warren Buffett, a legendary investor, did not mince words when recently debunking MPT (in the course of a lecture titled “What Every Lawyer Should Know About Business” at Stanford Law School) as “a lot of nonsense.”

To illustrate his point, he related the story of his acquisition of nearly 10 percent of the Washington Post Company for \$80 million in 1974. According to Buffett, the entire company could easily have been sold for \$400 million at the time and no expert would have questioned this valuation.

“Now, under the whole theory of beta and modern portfolio theory,” Buffett said, “we would have been doing something riskier buying the stock for \$40 million than we were buying it for \$80 million, even though it’s worth \$400 million – because it would have had more volatility. With that, they’ve lost me.”<sup>5</sup> Buffett’s investment grew 25-fold over the next 15 years.

America’s most successful investor began his career as a paperboy, bought his first stock at age 11 and is now the second richest person in the US, according to a recent Forbes Magazine article. Buffett acquired his wealth, estimated at some \$3.3 billion, solely through patient “value investing” – purchasing undervalued stocks of companies that are managed well and have a strong franchise. For Buffett, this approach has delivered long-term, superior returns.

Buffett is famous for saying that his favorite holding period is “forever.” He founded Buffett Partnership, Ltd., in 1956 and, using a long-term approach, grew it 30-fold over 13 years. Even after dissolving the partnership in 1969 and converting a textile company, Berkshire Hathaway (a 1965 acquisition), into an investment holding company, he consistently outperformed the market. An investment of \$10,000 in Buffett Partnership, Ltd., in 1956, converted to Berkshire Hathaway in 1969, would be worth more than \$25 million today, after commissions and fees.

This impressive long-term performance showcases the absurdity of the Efficient Market Hypothesis – the lynchpin of MPT. Although Buffett became a multibillionaire capitalizing on market inefficiencies, he remains a modest man, still living in Omaha with no urge to exchange the house he bought years ago for \$32,000 for a mansion in Beverly Hills.

### **Gap Between Theory and Practice**

Despite its obvious flaws, MPT continues to enjoy wide popularity among investment professionals, particularly in Europe – although its advocates have yet to make the Forbes 400 List. Even when Sharpe himself questioned the efficiency of the markets in the wake of the 1987 crash,<sup>6</sup> MPT devotees apparently did not think to reevaluate their risk-return strategies.

Given the unrealistic premises of CAPM, no one should be surprised that these strategies do not work. Looking at recent stock market history, here's an example of the potential danger of basing investment decisions on risk and return forecasts that rely primarily on the extrapolation of historical data:

In the 1980s, banks and brokers – faced with a growing trend toward globalized securities markets – felt compelled to develop strategies for structuring globally diversified portfolios or investment funds. Many of these strategies were based on CAPM, using risk and return estimates.

By 1990, the Japanese stock market had attracted a disproportionate number of MPT proponents. Why? MPT practitioners were seeing low volatility in Japanese equities, low in terms of standard deviation of monthly returns over the previous five years when compared to other equity markets. They perceived risk to be low and expected returns to be high. Their optimism, unfortunately, was misplaced.

Taking the MSCI Japan Index as a proxy, the Japanese stock market declined almost 47 percent during the first nine months of the current year, more than any other equity market contained in the MSCI World Equity Index. By contrast, the Dutch stock market, which had the same standard deviation as the Japanese market (5.2 percent), dropped by only 17.2 percent. And, the Australian stock market, which had a standard deviation of 7.4 percent at the end of the year, dropped by only 13.7 percent.

The low standard deviation of returns over the preceding five years gave followers of MPT a false sense of security. In reality, the Japanese stock market was risky because it was extremely overvalued in absolute terms, compared to its own history and compared to the World Index. If, as MPT assumes, there were a positive correlation between expected returns and risk (defined as volatility), the overvaluation of the Japanese market should have had no bearing on subsequent returns. Yet the CAPM followers suffered the same plight as Hans Christian Andersen's fabled emperor, whose new clothes were universally admired for their elegance, although he was in fact wearing nothing at all.

CAPM input variables are estimates, i.e. fictitious rather than known quantities; and the model output naturally reflects the accuracy of the input. Apart from this, managers who believe that they can manage risk through beta tend to periodically fine-tune portfolios based on their expectations of the future market direction. In other words, they engage in market timing experiments that have a very low probability of being successful, as Robert Jeffrey showed in 1984.<sup>7</sup>

Richard Baillie and Ramon DeGennaro recently published the results of an extensive study<sup>8</sup> that, contrary to MPT, found very little evidence of a positive correlation between portfolio returns and standard deviation.<sup>9</sup> One does not need their scholarly research to see the obvious, however. Most practitioners intuitively grasp the fact that returns and volatility are not necessarily linked, just as defining risk as volatility runs counter to common sense, regardless of how universal the supposition may be. Standard deviation and beta have nothing to do with what a pragmatic market professional regards as investment risk: the possibility of suffering losses.

### **Risk-adjusted performance measurement**

An accurate measure of risk must factor in the probability of loss and its potential magnitude. The expectation of loss – measured over a long period – meets this requirement. The expectation of loss is calculated by multiplying the probability of a loss<sup>A</sup> by the average period loss.<sup>B</sup> Another indication of investment risk is the maximum drawdown from a previous high – peak to trough.

Having established that volatility does not equal risk, we must look beyond standard deviation or beta if we want to measure risk-adjusted performance in a meaningful way.<sup>10</sup> Performance calculations that properly reflect a common-sense definition of investment risk need to include relevant risk measures such as the expectation of loss.

A comprehensive presentation of portfolio performance (that helps clients differentiate fund managers who are merely lucky from those who pursue successful strategies) should include the following risk and return data, which, for comparison purposes, should be accompanied by the same information for the benchmark index:

---

<sup>A</sup> The probability of a loss is calculated as the number of all losing periods within a specific timeframe divided by the number of all periods examined.

<sup>B</sup> The average period loss is the sum of all losses (realized and unrealized) divided by the number of losing periods.

1. Number of periods under review (months, quarters, years)
2. Number of winning periods
3. Number of losing periods
4. Arithmetic average return
5. Geometric average return
6. Highest period return
7. Lowest period return

8. Probability of a period gain ( $2 \div 1$ )
9. Average return in winning periods
10. Expectation of a period gain ( $8 \times 9$ )
11. Probability of a period loss ( $3 \div 1$ )
12. Average loss in losing periods
13. Expectation of a period loss ( $11 \times 12$ )
14. Largest losing streak (number of successive loss periods)
15. Largest percentage decline from a previous high (maximum drawdown)
16. Standard deviation of average period return (to assure comparability with traditional performance measurements)

Using 4, 13, and 16, we can calculate both the risk-adjusted return ( $4 \div 13$ ) and the volatility-adjusted return ( $4 \div 16$ ), the latter essentially being offered for comparison with CAPM “optimized” portfolios.

Even though the expectation of a period loss is a far more useful measure than volatility in calculating risk-adjusted performance, it is as useless as the standard deviation or beta when trying to predict future absolute risk. The best way to reduce relative risk is to apply sound “margin-of-safety” concepts (purchasing securities below their intrinsic value) and diversification. These strategies have a proven record of success both for US stock investments and for portfolios comprising internationally diversified equities.<sup>11</sup>

### **The time-specific nature of risk**

Another factor that is critical in evaluating the risk of any investment is the time horizon of the investor. Benjamin Graham, the father of security analysis, observed long ago that a potential decline in the price of a stock does not ultimately raise the risk of loss if the decline is temporary and if the probability of selling during the decline is low.

Graham applied the concept of risk solely to “a loss of value which either is realized through actual sale, or is caused by a significant deterioration in the company’s position – or, more frequently perhaps, is the result of the payment of an excessive price in relation to the intrinsic worth of the security.”<sup>12</sup> Robert Jeffrey placed vulnerability to future liquidity needs at the center of his definition of risk – “the probability not to have enough cash to make necessary payments.”<sup>13</sup> Both definitions view risk in relation to time. The diagram of US equity market returns, shown below, illustrates this relationship:

**Range of Returns of US Stocks for Various Holding Periods**  
— 1926 through 1988, nominal —



	1-Year Periods	5-Year Periods	10-Year Periods	15-Year Periods	20-Year Periods	25-Year Periods
<b>High</b>	54.0% (1933)	23.9% (50-54)	20.1% (49-58)	18.2% (42-56)	16.91% (42-61)	14.7% (42-67)
<b>Average</b>	12.1%	9.8%	10.1%	10.0%	10.5%	10.8%
<b>Low</b>	-43.3% (1931)	-12.5% (28-32)	-0.9% (29-38)	0.6% (29-43)	3.1% (29-48)	5.9% (29-53)

The diagram illustrates that equity investments fluctuate widely from year to year, offering the chance of achieving high returns but at a significant risk of loss. During the 63 years from 1926 through 1988 the annual returns of stocks ranged from +54 percent (1933) to minus 43.3 percent (1931). As holding periods became longer, there were corresponding smaller fluctuations, the risk of loss decreased, and the returns followed the long-term average more closely.

As holding periods become longer, the performance gap between stocks and fixed-income investments widens as well. From 1926 through 1989, US stocks (as measured by the Standard & Poor's 500 Index) produced an average annual return of 12.4 percent or 8.9 percent after inflation. By contrast, medium-term US government bonds (with a remaining maturity of 7-1/2 years) earned only 4.9 percent per annum or 1.8 percent, adjusted for inflation, and three-month T-bills just barely kept ahead of inflation.

In Germany, from 1955 through 1988, the average annual equity return, as measured by the Commerzbank Stock Index, was a nominal 13 percent or 9.8 percent after inflation. German bonds yielded 4.1 percent, adjusted for inflation. Three-month German bank time deposits (Festgelder) returned 2.6 percent after inflation.

The fact that equity returns are prone to fluctuate widely in the short run, although stocks significantly outperform bonds in the long run, vividly shows the importance of the investment horizon and future liquidity requirements when contemplating an appropriate investment strategy.

Buying stocks with the intention of selling them in six months to meet anticipated liquidity needs is indefensibly risky, even if the stock prices are attractive. By contrast, looking beyond short-term fluctuations, a young person who is contemplating investment options for a retirement plan would be hard-pressed to find one that is superior to equities.

Since investing in equities is much safer over a five-year vs. a one-year period, and, based on past experience, the risk of loss becomes almost negligible over a 15 to 20-year period, the equity allocation of a portfolio should be increased as the investment horizon is lengthened.

### **Practical Conclusions**

Understanding the relationship between risk and return well enough to tailor an investment strategy to the individual needs of a client does not require knowledge of complex theoretical constructs such as alpha or beta. Rather than relying on the longitude and latitude of a small dot next to a regression line to evaluate risk, it would be more rational and productive just to ask a few simple questions:

- ✓ What is the client's investment horizon?
- ✓ What average returns did the investment alternatives under consideration yield over comparable periods in the past?
- ✓ What was the probability of a negative return in the past?
- ✓ Are the investments that are being considered over- or undervalued in absolute and relative terms?
- ✓ Has the gap between price and value widened to a point where a correction is likely, based on past experience?

While this methodology will not completely eliminate the risk of loss, it will certainly reduce it. And you don't need to know any higher math to use it. As Warren Buffett said, "If you've gone and gotten a PhD and spent years learning how to do all kinds of tough things mathematically, to have it come back to this – it's like studying for the priesthood and finding out that the Ten Commandments were all you needed."

---

<sup>1</sup> Harry Max Markowitz, *Portfolio Selection*, Cowles Monograph 16, Yale University Press, New Haven 1959; William Forsyth Sharpe, "A Simplified Model for Portfolio Analysis," *Management Science*, Vol 9,

---

No. 1, pp. 277-293, Institute of Operations Research and Management Science, Northwestern University (Jan 1963); William Forsyth Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," *Journal of Finance*, Vol. 19, Issue 3, pp. 425-442, American Finance Association (September 1964); John Lintner, "Security Prices, Risk, and Maximal Gains from Diversification," *Journal of Finance*, Vol. 20, Issue 4, pp. 587-615 (December 1965); Fischer Black, Michael C. Jensen, Myron S. Scholes, "The Capital Asset Pricing Model: Some Empirical Tests," *Studies in the Theory of Capital Markets*, edited by Michael Jensen, Praeger Publishers (Greenwood Publishing Group), New York (1972).

<sup>2</sup> George M. Frankfurter, Herbert E. Phillips, John P. Seagle, "Portfolio Selection: The Effects of Uncertain Means, Variances and Covariances," *Journal of Financial and Quantitative Analysis* Vol. 6 (5), pp. 1251-1262, University of Washington (1971); George M. Frankfurter, Herbert E. Phillips, "Alpha Beta Theory: A Word of Caution," *Journal of Portfolio Management* 3/4, Institutional Investor (Summer 1977).

<sup>3</sup> Frank Mella, "Die gute Mischung macht den Meister," *Das Wertpapier* 12 (June 2, 1989).

<sup>4</sup> Frankfurter, Phillips, "Alpha Beta Theory."

<sup>5</sup> Excerpts by Warren Buffett as guest lecturer at Stanford Law School, March 23, 1990, reprinted in *Outstanding Investor Digest*, Vol. V, No. 3 (April 18, 1990).

<sup>6</sup> "My theory assumes that at any given time, market prices reflect investors' opinions of the future course of the economy ... The crash certainly raises serious questions about the efficiency of the markets." – Quoted in: Louis Uchitelle, "Professors With Influence Far Beyond Their Schools," *The New York Times*, Section D, pg. 6, Column 4 (October 17, 1990).

<sup>7</sup> Robert Jeffrey, "The Folly of Stock Market Timing." *Harvard Business Review* (July-August 1984); Jeffrey demonstrated how difficult it is to achieve above-average portfolio returns using marketing-timing strategies. He compared the results of two hypothetical investors who have the ability to switch between stocks and cash at the beginning of each quarter. Over different periods, ranging from 7 to 57 years, the probability of losing from market-timing strategies is double the chance of winning.

<sup>8</sup> Richard T. Baillie, Ramon P. DeGennaro, "Stock Returns and Volatility," *Journal of Financial and Quantitative Analysis*, Vol. 25, pp. 203-214, University of Washington (1990).

<sup>9</sup> For further criticism of the use of variance to measure risk, see (i) Warren W. Hogan and James M. Warren, "Toward the Development of an Equilibrium Capital-Market Model Based on Semivariance," *Journal of Financial and Quantitative Analysis*, Vol. 9, University of Washington (1974); (ii) Alan Kraus, Robert H. Litzenberger, "Skewness Preference and the Valuation of Risk Assets," *Journal of Finance*, Vol. 31, Issue 4, pp. 1085-1100 (September 1976); (iii) Vijay S. Bawa and Eric B. Lindenberg, "Capital Market Equilibrium in a Mean-Lower Partial Moment Framework," *Journal of Financial Economics*, Vol. 5, pp. 189-200 (1977); (iv) Kelly Price, Barbara Price, Timothy J. Nantell, "Variance and Lower Partial Moment Measures of Systematic Risk: Some Analytical and Empirical Results," *Journal of Finance* 37 (1982).

<sup>10</sup> We object to the view that portfolio managers can meet client needs by measuring risk-adjusted performance using beta as a proxy for risk. See, for example, Heinz-Josef Hockmann, "Performance-Messung von Wertpapier-Portfolios" [Performance Measurement of Securities Portfolios], *Die Bank* 3 (1987), Publisher: Bundesverband deutscher Banken e.V. [Federal Association of German Banks].

<sup>11</sup> Michael Keppler, "The Importance of Dividend Yields in Country Selection," *Journal of Portfolio Management*, Vol. 17, No. 2, pp. 24-29 (Winter 1991); see also (i) the quarterly research publication, "Global Equity Markets, Strategic Country Allocation," published by Commerzbank Capital Markets Corporation, New York; (ii) David M. Cutler, James M. Poterba, Lawrence H. Summers, "International Evidence on the Predictability of Stock Returns," Sloan School of Management, MIT (1988).

---

<sup>12</sup> Benjamin Graham, *The Intelligent Investor*, pg. 61, Harper, New York (1973).

<sup>13</sup> Robert H. Jeffrey, "A New Paradigm for Portfolio Risk," *Journal of Portfolio Management*, pp. 33-40, Vol. 11, No. 1, Institutional Investor, New York (Fall 1984); Ralph Kosmicke, "The Limited Relevance of Volatility to Risk," *Journal of Portfolio Management*, pp. 18-20, Vol. 13, No. 1 (1986).