

How does the size of the common stock risk premium affect portfolio diversification?

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Summary: Diversification depends upon the expected equity premium and the correlation of price movements between individual stocks in the market. Depending on the size of the equity risk premium, non-diversified individual investors could unwittingly give up their entire expected equity premium. This is an extraordinarily unproductive risk to take. As other diversification articles in The Skilled Investor have demonstrated, the simplest way to achieve the important risk reduction benefits of diversification is to buy broad based passive index funds and exchange-traded funds. There is no magic minimum number of stocks. (See: [Why is diversification valuable to individual investors?](#) and [Can a limited number of equities provide complete portfolio diversification?](#)) Diversification depends upon the expected equity premium and the correlation of price movements between individual stocks in the market. In his paper, "How Much Diversification is Enough?" Professor Meir Statman of the University of Santa Clara provides important insights on these topics.¹ He shows that at least 120 stocks and perhaps considerably more may be required to equal the cost-adjusted diversification available through low-cost index mutual funds. Professor Statman analyzed the optimal number of randomly selected stocks that would be necessary to achieve a level of cost-adjusted diversification similar to the Vanguard Total Stock Market Fund, the example he chose of a highly diversified, low cost index mutual fund. At the time of the study, this Vanguard index fund held 3,444 stocks and had an annual net cost of .15% of portfolio assets. Professor Statman demonstrated that the optimal diversification of portfolios depended upon: 1) the risk premium (the expected excess return of equities over the risk free rate of return), 2) the covariance (the average correlation of price movements between stocks), and 3) the costs or fees associated with portfolio management. (See also: [How do changes in common stock price volatility affect diversification?](#)) Professor Statman analyzed two possible levels of the equity risk premium and two possible levels of covariance. He compared the expected returns of portfolios containing various numbers of stocks to the alternative of investing in a broad-based market index fund. Using these equity premium and correlation assumptions, Professor Statman then estimated the number of randomly selected stocks needed to achieve a level of expected diversification that is equivalent to the cost-adjusted diversification provided by the Vanguard Total Stock Market Fund. Table 1 highlights selected data from Professor Statman's paper. Table 1 -- Minimum Number of Randomly Selected Stocks Needed in a Portfolio to Equal the Expected Diversification of a Low-cost Index Mutual Fund²

Price Movement Correlation between Any Two Stocks				If the Equity Premium = 3.44%
If the Equity Premium = 8.79%				
If the correlation = .08	120 stocks	300 stocks		
If the correlation = .28	25 stocks	70 stocks		The average correlation of price movements between any two stocks in the market declined significantly from .28 in the early 1960s to .08 in 1997. Therefore, Professor Statman presented results for both of these cases. Given that the price movement correlation between stocks has declined, an investor should probably pay more

attention to the .08 correlation row in Table 1. While the realized annualized 1926-2001 equity return premium was 8.79%, Professor Statman indicated that current speculation is that it could be significantly lower in the future. He also presented optimal diversification results for an equity premium of 3.44%. While this later number is significantly lower, the scientific investment literature indicates that it is closer to the long-term historical average. (See: [What have average investment asset class risk premiums been over long periods?](#) and [What happens to the expected equity premium, when the common stock P/E ratio reverts toward historical norms?](#)) Professor Statman concluded that, if individuals are going to hold individual common stocks in their investment portfolios, they should hold more than 120 different randomly selected stocks. This number would allow them to avoid holding a suboptimal portfolio that had higher risk and lower cost-adjusted expected returns relative to a market index fund. The degree to which the expected equity premium is higher or a portfolio is not randomly selected, then the number of required stocks could be very significantly higher. You should note that Professor Statman's objective in performing this analysis was not simply to derive optimal portfolio diversification numbers, but to illustrate the implications of optimal diversification versus the very common behaviors of individual investors in holding very low numbers of stocks in their portfolios. Professor Statman referred to the 2001 study by Professors Kumar and Goetzmann,³ which found that the median and average numbers of stocks held by individual investors were only three and four, respectively. (See: [Is the average individual investor portfolio well diversified?](#) and [What is the cost to individual investors of sub-optimal portfolio diversification?](#)) Professor Statman stated that this "lack of diversification is costly. Investors who hold only 4 stocks in their portfolios forego the equivalent of a 3.3% annual return relative to investors who hold the 3,444 stocks of the Vanguard Total Stock Index Stock Market Index fund."⁴ Note that, if the projected annual equity premium is 3.44%, this means that such non-diversified individual investors may give up almost their entire expected equity premium for the undiversified individual stock portion of their holdings. These investors would be taking on the risk of equities without any greater expected return than holding the risk free security. (See: [How are asset class risk premiums and the risk free rate of return related?](#)) Professor Statman argues that this non-optimal behavior is symptomatic of the behavioral characteristics of investors who mentally segregate their investments between conservative holdings for downside protection and risky, "lottery ticket" style investments (e.g. a few equities). This later behavior is characteristic of a gambler's naïve hope of achieving significant upside returns, while playing a game that, in fact, favors the casino. Contrary to casino gambling, the stock market has had a long-term positive payoff through the equity premium. Before costs, the gambler's expected pay-off with a casino is zero. With the casino's additional "cut" or cost to gamblers, the expected return is negative. Let us hope that the gamblers have fun, although the serious and dour expressions of most people in casinos makes one wonder. With the stock market, the good news is the expected payoff is positive. The bad news is that investment costs are equivalent to the casino's "cut." If you do not watch your investment costs, then securities industry intermediaries will significantly reduce your returns, as they take their "cut." (See: [The investment industry is not your investment partner](#))

These related articles may also be useful to you: ->[What is investment portfolio diversification?](#) -> [Investment securities markets do not pay you for the risks of holding individual common stocks and bonds](#) ->[What is a well-diversified portfolio?](#) ->[How many common stocks are needed for a well-diversified portfolio?](#) ->[How does the size of the common stock risk premium affect diversification?](#) ->[How many mutual funds are needed for a well-diversified portfolio? – evidence](#) ->[How many mutual funds are needed for a well-diversified portfolio? – a commentary](#) 1) Meir Statman, "How Much Diversification is Enough?" Working paper; September 2002: 1-17 <http://lsb.scu.edu/faculty/profiles/statmanprofile.htm>

2) *ibid*, Table 1

3) Alok Kumar and William Goetzmann. "Equity Portfolio Diversification." Working paper series National Bureau of Economic Research 2001: 38 <http://www.nber.org/> Kumar: <http://www.mcombs.utexas.edu/dept/finance/faculty/>

4) Statman, *op cit.*, p. 14