

[How many mutual funds are needed for a well-diversified portfolio? - evidence](#)
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How Many Mutual Funds are Needed for a Well-Diversified Portfolio? – Evidence
Actively-managed mutual funds are not created equally. Performance can vary significantly – even when funds pursue similar strategies or "styles." This article addresses the impact on portfolio diversification by holding more than one actively-managed mutual fund. (For the companion article to this, see: [How many mutual funds are needed for a well-diversified portfolio? – a commentary](#))
In "How Many Mutual Funds Constitute a Diversified Mutual Fund Portfolio?," Professor Edward O'Neal of the University of New Hampshire at Durham tackled the important question of how much an investor could improve on diversification by holding multiple mutual funds in an investment portfolio.¹ While there are large numbers of studies addressing the "how many common stocks" question, there are few that address the "how many mutual funds" question. Professor O'Neal's is the best study on this subject that *The Skilled Investor* has yet found. Holding multiple actively-managed mutual funds tends to reduce the volatility or risk of your long-term investment portfolio. Professor O'Neal used Morningstar data for all U.S. "growth" style and "growth and income" style mutual funds that were in operation throughout the 1976 to 1994 period. For the full 19-year period, respectively, there were 103 and 65 of these mutual funds. He estimated the cumulative returns and volatility of investment portfolios that were composed of between one and thirty randomly selected mutual funds over various periods ranging from five to nineteen years.

Concerning his study methods, for a portfolio with a single fund, Professor O'Neal assumed an initial \$1 investment and calculated compound returns and volatility quarterly and at the end of multi-year periods. Then, he averaged returns across all mutual funds of the same style. For portfolios of between two or more - up to thirty - mutual funds, Professor O'Neal randomly selected mutual funds to hold through the end of the investment period. Initially, he distributed \$1 evenly across these funds. On a quarterly basis, he rebalanced equally across them. For each combination of 1) number of funds, 2) investment period, and 3) growth versus growth-and-income funds, he ran 1,000 simulations and averaged the cumulative returns and volatility. The two tables below transform certain data from the many detailed tables available in this excellent study.² *The Skilled Investor* assumes a normal distribution in estimating the dollar ranges in these tables. Therefore, the dollar ranges in these tables are probably close to but not exactly the same as the actual data underlying this study. Table 1 shows the percentage variation and \$ range of terminal wealth for growth-and-income style mutual funds and growth style mutual funds after 10 years for various numbers of mutual funds in a particular investment portfolio. Clearly, holding multiple mutual funds helps to increase portfolio diversification by narrowing down the expected range of terminal wealth at the end of the period. For example, with growth and income style funds, moving from one to five funds reduced variability from 18% to 11% after 10 years. The value of diversification is even more pronounced for the growth mutual funds. Moving from one to five growth funds reduced variability by from 23% to 10% after 10 years. Table 1 -- Cumulative Returns or Terminal Wealth after 10 Years [1985 to 1994; \$1 Invested Across Various Numbers of Mutual Funds; 1,000 Simulation Runs Each]

	Growth and Income Mutual Funds	Growth Mutual Funds
Number of Mutual Funds	% Variation (1 standard deviation divided by the average return)	\$ Range (1 standard deviation divided + or – the average return)

% Variation (1 standard deviation divided by the average return)
 \$ Range (1 standard deviation divided + or – the average return)

- 1 18% \$2.61 to \$3.77 23% \$2.64 to \$4.17
- 2 15% \$2.70 to \$3.66 16% \$2.87 to \$3.95
- 3 14% \$2.72 to \$3.62 12% \$2.97 to \$3.81
- 5 11% \$2.81 to \$3.53 10% \$3.05 to \$3.73
- 10 8% \$2.99 to \$3.37 7% \$3.17 to \$3.63

Table 2 shows the percentage variation and \$ range of terminal investment portfolio wealth for growth-and-income mutual funds and growth mutual funds after 19 years for various numbers of mutual funds in a particular investment portfolio. Increasing the investment horizon from 10 to 19 years significantly increased the variability of terminal wealth. When one compares the terminal variability associated with holding just one mutual fund after 10 years in Table 1 versus after 19 years in Table 2, the increase in return performance variability is dramatic. For growth-and-income funds, variability for a single fund doubles from 18% to 37%, and for growth funds single-fund variability goes up by a factor of about 2½ times from 23% to 59%! Table 2 -- Cumulative Returns or Terminal Wealth after 19 Years [1976 to 1994; \$1 Invested Across Various Numbers of Mutual Funds; 1,000 Simulation Runs Each]

	Growth and Income Mutual Funds	Growth Mutual Funds
Number of Mutual Funds	% Variation (1 standard deviation divided by the average return)	\$ Range (1 standard deviation divided + or – the average return)
	% Variation (1 standard deviation divided by the average return)	\$ Range (1 standard deviation divided + or – the average return)

- 1 37% \$6.62 to \$14.55 59% \$5.96 to \$22.82
- 2 27% \$7.65 to \$13.33 37% \$8.68 to \$19.08
- 3 24% \$7.94 to \$12.97 28% \$9.69 to \$17.37
- 5 19% \$8.31 to \$12.31 22% \$10.64 to \$16.46
- 10 15% \$8.68 to \$11.70 15% \$11.56 to \$15.78

With this longer, 19-year time horizon in Table 2, holding multiple mutual funds helps even more to increase portfolio diversification and narrow the range of terminal wealth. With a 19-year horizon for growth-and-income funds, moving from one to five funds reduced variability from 37% to 19%. The value of portfolio diversification is more pronounced for the growth mutual funds. With a 19-year horizon, moving from one to five growth funds reduced variability from 59% to 22%. Remember, of course, that Table 1 and Table 2 provide data for variability among actively-managed mutual funds with either a full or partial growth objective. The performance volatility among passively-managed index funds would be dramatically narrower. *The Skilled Investor* has summarized this information for those millions of you who persist in paying substantially higher fees for actively-managed mutual funds, instead of just buying passively-managed index mutual funds and index ETFs. On average, buying actively-managed mutual funds is more likely to be an inferior investment strategy for you. This study demonstrates that the failure to diversify among actively-managed mutual funds can expose you to huge variations in outcomes. Nevertheless, choosing one or many actively-managed mutual funds is just a crap shoot. When you spread your investment across many of them, at least you can achieve some diversification benefits, but at an unnecessarily high price. Since there is no credible evidence that you can identify superior active investment fund managers before the fact, you can only hope that you picked winners rather than losers. Instead, reducing mutual fund investment costs is the more reliable way to achieve superior returns and narrow the range of future outcomes. This means moving away from actively-managed mutual funds and toward very low cost index mutual funds and index ETFs. (See: [What the instability of mutual fund Morningstar Ratings means for long-term investors – a commentary](#))¹ Edward S. O'Neal, "How Many Mutual Funds Constitute a Diversified Mutual Fund Portfolio?" Financial Analysts

Journal, March/April 1997: 37-46

2) Note that the dollar range of terminal wealth is calculated based upon variances supplied in O’Neal 1997, but since the actual distributions were skewed to the right this is only an illustrative approximation of the actual range of the data.

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