

# Understanding the performance of small-cap stocks



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*“Small caps play a role in a total market portfolio. They behave differently from large caps and consequently provide important diversification benefits to portfolios of large-cap stocks.”*

## Key takeaways

- Small-cap stocks play an important role in a well-diversified portfolio.
- When implementing a small-cap strategy, it’s important to account for relative price, profitability, and investment characteristics, as well as the interaction between different premiums.
- Broad diversification and a consistent focus on reliable drivers of expected returns can increase the likelihood of capturing these premiums.

## Executive summary

Historically, small-cap stocks have had higher average returns than large-cap stocks; however, this size premium hasn’t appeared across all segments of small caps. In this paper, we look at the available sample period in the United States (back to the 1920s), various subperiods, and different segments of the small-cap universe to better understand the returns of small-cap relative to large-cap stocks. Our findings have important implications for structuring an allocation to small-cap stocks.

### A range of expected returns

Not all stocks have the same expected return. For example, some investors may see some stocks as having greater risk than others and, in turn, demand a higher expected return to be compensated for the perceived risk. Other investors may simply prefer particular stocks over others. Given there’s a range in expected returns across stocks, how can we reliably identify the differences?

### Using market prices to identify differences in expected returns

A stock’s current price reflects information about expected future cash flows discounted by the expected stock return. This means that a higher expected return should be related to a lower stock price. Empirical studies using data covering over 40 countries and spanning close to a century have identified two price metrics that contain reliable information about differences in expected returns: company size, defined as price times shares outstanding, and relative price, defined as price scaled by a fundamental accounting variable, such as book equity. Further, many studies show that cash flow variables, such as profitability and investment, also contain reliable information about the cross-section of expected stock returns.

## Small-cap performance

Annualized return (%), July 1926–December 2018

	1 year	3 years	5 years	10 years	20 years	50 years	Since July 1926
<b>Fama/French U.S. Small Cap portfolio</b>	-11.22	7.63	4.15	12.89	8.91	10.19	11.65
<b>Fama/French U.S. Large Cap portfolio</b>	-4.76	9.44	8.19	13.34	5.97	9.84	9.83

Source: Fama/French data is provided by Fama/French and is available at Professor Kenneth French's website at [mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), as of 11/19/19. The Fama/French U.S. Small Cap portfolio is the value-weighted average return of the bottom five decile portfolios from portfolios formed on size. The Fama/French U.S. Large Cap portfolio is the value-weighted average return of the top five decile portfolios from portfolios formed on size.

## The U.S. size premium

To examine the existence of a size premium in the United States, we looked at the historical performance of the Fama/French U.S. Small and Large Cap portfolios, as they go back almost a hundred years. Comparing the annualized compound returns of the Fama/French U.S. Small Cap portfolio and the Fama/French U.S. Large Cap portfolio, we find that small-cap stocks have outperformed large caps since the 1920s.

To examine the size premium in context with other premiums, we examined the average returns of the equity, size, and relative price premiums from January 1927 to December 2018 and January 1964 to December 2018; the latter period also includes the profitability and the investment premiums.<sup>1</sup> For the whole period, the size premium in the United States was 21 basis points (bps) per month on average and reliably different from zero (t-statistic: 2.18). From 1964 to 2018, the magnitude of the

size premium was similar (22bps per month on average), but not reliably different from zero (t-statistic: 1.80).

To further investigate the presence of the size premium in the 1964 to 2018 period, we next examine the interaction between the size premium and the other premiums.

## A closer look at the size premium

Consistent with valuation theory, empirical research has identified that certain subsets of small-cap stocks have historically underperformed the rest of the small-cap universe. It's important to consider these subsets of stocks when forming strategies to effectively pursue the size premium.

As reported by Fama/French (1993), small-cap growth stocks have historically failed to deliver the size premium.<sup>2</sup> For that reason, it makes sense to isolate small-cap growth stocks from

## Is there a size premium?

U.S. market evidence

	Equity premium	Size premium	Relative price premium	Profitability premium	Investment premium
	Equity market return minus risk-free rate (U.S. T-bills)	Small minus big	High minus low	Robust minus weak	Conservative minus aggressive
<b>Average return (%), January 1927–December 2018</b>	0.65	0.21	0.37	—	—
<b>Standard deviation (%), January 1927–December 2018</b>	5.35	3.20	3.49	—	—
<b>t-statistic</b>	4.02	2.18	3.51	—	—
<b>Average return (%), January 1964–December 2018</b>	0.51	0.22	0.32	0.26	0.29
<b>Standard deviation (%), January 1964–December 2018</b>	4.40	3.07	2.81	2.18	2.00
<b>t-statistic</b>	2.96	1.80	2.96	3.02	3.69

Source: [mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), as of 12/31/18. These premiums are not available for direct investment; therefore, their performance does not reflect the expenses associated with the management of an actual portfolio. Equity market return minus risk-free rate is the excess return on the market minus the one-month U.S. Treasury bill rate (from Ibbotson Associates). The Fama/French three factors are constructed using the six value-weighted portfolios formed on size and book to market. Small minus big is the average return on the three small portfolios, minus the average return on the three big portfolios. High minus low is the average return on the two value portfolios, minus the average return on the two growth portfolios. The Fama/French profitability factor is constructed using the six value-weighted portfolios formed on size and operating profitability. Robust minus weak is the average return on the two robust operating profitability portfolios, minus the average return on the two weak operating profitability portfolios. The Fama/French investment factor is constructed using the six value-weighted portfolios formed on size and investment. Conservative minus aggressive is the average return on the two conservative investment portfolios, minus the average return on the two aggressive investment portfolios.

## Small-cap growth appears to lack a reliable premium

	U.S. small growth—U.S. large growth	U.S. small ex-growth—U.S. large ex-growth
Average monthly return (%), January 1927–December 2018	0.07	0.34
Standard deviation (%), January 1927–December 2018	4.05	3.32
t-statistic	0.56	3.41
Average monthly return (%), January 1964–December 2018	0.01	0.35
Standard deviation (%), January 1964–December 2018	3.95	2.98
t-statistic	0.06	2.29

Source: mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\_library.html, as of 12/31/18. The U.S. small growth and U.S. large growth portfolios are the standard 2x3 small and large growth portfolios formed on size and book-to-market ratios. U.S. small growth is the Small Low BE/ME portfolio. U.S. large growth is the Large Low BE/ME portfolio. U.S. small ex-growth is the value-weighted portfolio computed from combining the Small High BE/ME and the Small Neutral BE/ME portfolios. U.S. large ex-growth is the value-weighted portfolio computed from combining the Large High BE/ME and the Large Neutral BE/ME portfolios. The return difference between U.S. small ex-growth and U.S. large ex-growth can be interpreted as the small-cap premium in the neutral and value segments of the market. Returns assume reinvestment of dividends and capital gains.

the rest of the small-cap universe and examine their performance separately.

To do this, we looked at the size premium in the United States for the growth and nongrowth (neutral and value) segments of the market. Once again, we looked at the whole sample period from 1927 to 2018 and 1964 to 2018. From 1927 to 2018, on the growth side of the market, the size premium was 7bps per month on average, an estimate that wasn't reliably different from zero (t-statistic: 0.56). On the nongrowth side, the premium was 34bps per month on average and reliably different from zero (t-statistic: 3.41).

From 1964 to 2018, the size premium among growth stocks was 1bp per month on average but, again, not reliably different from zero (t-statistic: 0.06), while the size premium among nongrowth stocks was 35bps per month on average and reliably different from zero (t-statistic: 2.29).

What does this tell us? We infer that the growth segment of the small-cap universe is the primary driver of the weak evidence of the size premium. We next consider the interaction between small-cap growth stocks and profitability to more accurately

identify the area of the small-cap market with large historical underperformance.

For this, we then looked at U.S. small-cap growth stocks and separated those with low profitability from those with high profitability.

Small-cap growth, low-profitability stocks greatly underperformed from 1964 to 2018. Furthermore, the difference in performance between those groups—44bps per month, on average—was reliably different from zero (t-statistic: 3.14). This finding is consistent with multiple studies of this subset of stocks, including Clark/Rodríguez (2010), Rizova (2012), and Fama/French (2015).

By excluding small-cap growth, low-profitability stocks, we observe that between 1964 and 2018, the remaining small-cap market returned a 34bps monthly premium over the large-cap market, as measured by the Fama/French U.S. Small portfolio ex-Low Profitability Growth and the Fama/French U.S. Large portfolio, respectively. The premium was reliably different from zero (t-statistic: 2.94). This suggests that a small-cap strategy would benefit from excluding growth stocks with low profitability.

## The underperformance of small-cap growth, low profitability stocks

	U.S. small growth, ex-low profitability	U.S. small growth, low profitability	Return difference
Average monthly return (%), January 1964–December 2018	1.18	0.74	0.44
Standard deviation (%), January 1964–December 2018	5.64	7.57	3.59
t-statistic (U.S. small growth, ex-low profitability – U.S. small growth, low profitability)	—	—	3.14

Source: mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\_library.html, as of 12/31/18. Returns assume reinvestment of dividends and capital gains. U.S. small growth, ex-low profitability, is the Small Growth portfolio, excluding the highest relative price and lowest profitability stocks. U.S. small growth, low profitability, consists of the Small Growth portfolios with the highest relative price and lowest profitability. These portfolios were constructed from the Fama/French 2x4x4 portfolios formed on size, book to market, and operating profitability.

## The underperformance of small high investment stocks

	U.S. small low investment quartile	U.S. small investment quartile 2	U.S. small investment quartile 3	U.S. small high investment quartile
<b>Average monthly return (%), January 1964–December 2018</b>	1.30	1.29	1.28	0.91
<b>Standard deviation (%), January 1964–December 2018</b>	6.34	5.13	5.29	6.59

Source: [mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), as of 12/31/18. Returns assume reinvestment of dividends and capital gains. U.S. small investment quartiles were constructed from the Fama/French 2x4x4 portfolios formed on size, book to market, and investment.

We can further dissect expected return differences among small-cap stocks by considering the investment premium. Valuation theory predicts that, all else equal, expected investment should be negatively related to expected returns. Using recent asset growth as a proxy for expected investment, we observe that there's a negative investment effect, which is primarily driven by the underperformance of small, high asset growth firms.<sup>3</sup> We observe the investment premium across sectors and different value and profitability segments. From 1964 to 2018, the high investment quartile underperformed the rest of the small-cap market by 38bps per month on average (t-statistic: -4.86). However, there wasn't a significant average performance difference among the other three quartiles. This suggests that a small-cap strategy may account for the investment premium by avoiding those small-cap stocks that exhibit the highest investment.

Therefore, we'd expect a small-cap strategy would benefit from accounting for both the underperformance of small-cap growth, low profitability stocks, and the underperformance of small high asset growth firms.

### Investment implications

The existence of a size premium doesn't mean that small caps will outperform large caps every month or year. If that were the case, no one would want to hold large-cap stocks. The size premium is volatile (as are the equity, value, profitability, and investment premiums). Given that volatility and the interactions among drivers of expected returns, how should we think about structuring an allocation to small-cap stocks and their role in a broadly diversified portfolio?

Small caps play a role in a total market portfolio. They behave differently from large caps and consequently provide important diversification benefits to portfolios of large-cap stocks. As we've shown, an additional potential benefit of holding small-cap stocks is that, over time, they're expected to earn a premium over large-cap stocks.

What, then, is a sensible way of structuring an allocation to small-cap stocks? The first thing to realize is that the size premium is more or less driven by stock migration—stocks that move across market capitalization portfolios from one period to the next. The size premium is primarily driven by the positive performance of a subset of small-cap stocks that unpredictably moves to the mid- or large-cap space from one period to the next.

This unpredictable migration has important implications for investors because it highlights the importance of diversification in the design of robust investment solutions. As Fama and French (2007), among others, have shown, not all securities contribute equally to the premiums each year.<sup>4</sup> Some stocks do extremely well, while others have average returns or perform poorly. Research has also shown that it's not possible to reliably predict which of those stocks sharing common characteristics and similar expected returns are going to do well.<sup>5</sup> Concentrated portfolios may inadvertently exclude companies that ultimately generate most of those premiums, whereas broadly diversified portfolios are more likely to include those stocks and capture those premiums.

Also, as shown above, the premiums interact with one another, and there are trade-offs among the premiums, diversification, and costs. In an allocation to small caps, it's important to consider relative price, profitability, and investment characteristics. Small-cap stocks with high relative price and low profitability, as well as those with high asset growth, have historically accounted for a relatively small portion of the market and have substantially underperformed the small-cap market. Therefore, excluding these stocks from a small-cap strategy is expected to improve the performance without a large impact to the diversification.

What implications does this have for executing a strategy? Diversification, a consistent focus on known drivers of expected return, and accounting for interactions between these premiums can increase the reliability of outcomes.



**1** Profitability is measured by the profits-to-book ratio, with profits defined as operating income before depreciation and amortization minus interest expense. The sample periods are determined by the availability of the relevant index data. **2** "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics*, 1993. See also: "The Performance of Small Cap Growth Stocks," *Quarterly Institutional Review*, Dimensional Fund Advisors, 2010; "The Performance of International Small Cap Growth Stocks," *Quarterly Institutional Review*, Dimensional Fund Advisors, 2012; and "A Five-Factor Asset Pricing Model," *Journal of Financial Economics*, 2015. **3** "Investment and Expected Stock Returns" and "Implementing the Investment Premium: Small High Asset Growth Exclusion," Savina Rizova and Namiko Saito, 2019. **4** "Migration," *Financial Analysts Journal*, 2007. **5** For more information on the performance of mutual fund managers, see, for instance, "The Performance of Mutual Funds in the Period 1945–1964," *Journal of Finance*, 1968; "Luck vs. Skill in the Cross-Section of Mutual Fund Returns," *Journal of Finance*, 2010; and "Mutual Fund Performance through a Five-Factor Lens," [my.dimensional.com/insight/purely\\_academic/193867/](http://my.dimensional.com/insight/purely_academic/193867/), August 2016. See also "Mutual Fund Landscape 2019," Dimensional Fund Advisors, 2019.

One hundred basis points equals one percent. Price/book ratio is the ratio of a stock's price to its book value per share. Standard deviation is a statistical measure of the historic volatility of a portfolio. It measures the fluctuation of a fund's periodic returns from the mean or average. The larger the deviation, the larger the standard deviation and the higher the risk. A t-statistic is used when deciding to support or reject a null hypothesis and have a small sample size or if the population standard deviation isn't known. Diversification does not guarantee a profit or eliminate the risk of a loss. Past performance does not guarantee future results.

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