Dimensional

The Role of Small Caps

February 2015

Small caps are an important component of the total market—investors need a reason to exclude them, not a reason to include them. They tend to behave differently from large caps, thus providing important diversification benefits to portfolios of large cap stocks. Without these diversification benefits, returns of the equity market may not be captured in the most effective way.

An additional potential benefit of small cap stocks is that they are expected to earn a premium over large cap stocks. However, volatility in realized size premiums leaves room for some to question the existence of the size premium. The following points seek to address those primary critiques.

1. **The size premium is overstated because of reporting bias.** On his website, Ken French's US Research returns support the existence of a size premium[1] and include adjustments for delisted stocks. Therefore, the observed return differences are unlikely to be driven by delisting bias.

2. **The size premium does not survive trading costs.** This argument has been around for 30 years (see, for example, Stoll and Whaley, 1983). From January 1982 through March 2015, the annualized net return on the DFA US Micro Cap Portfolio was 61 bps higher than the annualized return on the CRSP 9-10 Index and 164 bps higher than the annualized return on the Russell 2000 Index. We have always taken into consideration the challenges associated with trading smaller stocks. Our strategies are designed and implemented to address those challenges and strive to deliver cost-effective solutions to our clients. The DFA US Micro Cap Portfolio's net returns reflect trading costs, and they are not impacted by delisting bias.

Small caps are part of the market portfolio and provide important diversification benefits to portfolios of large cap stocks.

1. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

3. The size premium is the result of data mining.
Arguments that the size premium is due to data mining can be addressed with out-of-sample evidence. Banz (1981) was the first to document the size premium. The 1981–2013 period offers out-of-sample evidence documenting the following average annual return differences:

	Average Difference (%)	t-statistic
Small Value–Large Value	4.32	2.12
Small Neutral–Large Neutral	3.95	2.14
Small Growth–Large Growth	-3.23	-1.36

Source: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. See Index Construction for details.
Past performance is no guarantee of future results.

We have known about the lack of evidence of a size premium in small growth since the 1990s. In the mid-2000s, Dimensional began conducting research that ultimately led to the enhancement of our understanding of the historical returns of small growth stocks. This seeks to allow investors to improve their expected performance of small growth by systematically isolating the stocks responsible for the poorer relative performance.

The more recent research development is the recognition that underperforming small growth stocks also tend to have low profitability, which has allowed us to further refine our small-cap low profitability exclusion.

Evidence of both size and value premiums are observed after incorporating profitability. Average annual returns from 1975–2013:

	Small	Large
Value	21.86	17.03
Growth	13.88	12.51
Growth with Profitability	17.98	13.91

Past performance is no guarantee of future results. It is not possible to invest directly in an index. Source: Dimensional US Small Cap Value Index, Dimensional US Small Cap High Price-to-Book Index, Dimensional US Small Cap Growth Index, Dimensional US Large Cap Value Index, Dimensional US Large Cap High Price-to-Book Index, and Dimensional US Large Cap Growth Index. See Index Descriptions for details.

4. There is no size premium in international markets.[2]
International index returns provide additional out-of-sample evidence supporting the existence of a reliable size premium outside the US. For the 1981–2013 period, the average annual return difference between the Dimensional International Small Cap Index and the MSCI World ex USA Index is 3.32% (t = 2.13).

5. The size premium is not existent on a risk-adjusted basis.
We disagree with the risk measurement measure used by some of the articles that support this critique. Some articles compare Sharpe ratios, which is a poor risk adjustment, in our opinion. Some of the volatility of small cap stocks (or any asset class) is reduced by diversification when combined with other asset classes. A comparison of asset class Sharpe ratios ignores this impact.

2. International investing involves special risks such as currency fluctuation and political instability. Investing in emerging markets may accentuate these risks. Sector specific investments can also increase investment risks.

REFERENCES

Banz, Rolf W. "The Relationship between Return and Market Value of Common Stocks." *Journal of Financial Economics* 9, no. 1 (1981): 3–18.

Fama, Eugene F., and Kenneth R. French. "The Cross-Section of Expected Stock Returns." *the Journal of Finance* 47.2 (1992): 427-465.

Stoll, Hans R., and Robert E. Whaley. "Transaction Costs and the Small Firm Effect." *Journal of Financial Economics* 12, no. 1 (1983): 57–79.

DISCLOSURES

This information is provided for registered investment advisors and institutional investors and is not intended for public use.

Eugene Fama and Ken French are members of the Board of Directors for and provide consulting services to Dimensional Fund Advisors LP.

Past performance is no guarantee of future results. Diversification does not protect against loss in declining markets. There is no guarantee strategies will be successful. It is not possible to invest directly in an index.

Annualized Returns as of 3/31/2015 (%)	1 Yr	5 Yrs	10 Yrs	Since 1/82 Portfolio 1st Full Month
US Micro Cap Portfolio	**5.54**	**16.12**	**8.83**	**12.32**
Russell 2000 Index	8.21	14.57	8.82	10.69
Russell Microcap Index	3.79	14.69	7.11	—

Performance data shown represents past performance and is no guarantee of future results. Current performance may be higher or lower than the performance shown. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. To obtain the most current month-end performance data, visit us.dimensional.com. Russell data © Russell Investment Group 1995–2015, all rights reserved. Indices are not available for direct investment.

Risks include loss of principal and fluctuating value. Small cap securities are subject to greater volatility than those in other asset categories. Sector-specific investments can also increase these risks. These risks are described in the Principal Risks section of the prospectus.

Dimensional Fund Advisors LP is an investment advisor registered with the Securities and Exchange Commission.

Consider the investment objectives, risks, and charges and expenses of the Dimensional funds carefully before investing. For this and other information about the Dimensional funds, please read the prospectus carefully before investing. Prospectuses are available by calling Dimensional Fund Advisors collect at (512) 306-7400 or at us.dimensional.com.

Dimensional funds are distributed by DFA Securities LLC.

INDEX CONSTRUCTION

The indices, which are constructed at the end of each June, are the intersections of two indices formed on size (market equity, or ME) and three portfolios formed on the ratio of book equity (BE) to market equity (BE/ME). The size breakpoint for year t is the median NYSE market equity at the end of June of year t. BE/ME for June of year t is the book equity for the last fiscal year-end in t-1 divided by ME for December of t-1. The BE/ME breakpoints are the 30th and 70th NYSE percentiles. The portfolios for July of year t to June of t+1 include all NYSE, AMEX, and NASDAQ stocks for which we have market equity data for December of t-1 and June of t and (positive) book equity data for t-1.

INDEX DESCRIPTIONS

Dimensional US Small Cap Value Index

January 1975–Present: Compiled by Dimensional from CRSP and Compustat data. Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market whose relative price is in the bottom 35% of the Dimensional US Small Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes securities with higher profitability, lower relative price, and lower market capitalization. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to March 2007. The calculation methodology for the Dimensional US Small Cap Value Index was amended on January 1, 2014, to include direct profitability as a factor in selecting securities for inclusion in the index.

June 1927–December 1974: Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market whose relative price is in the bottom 25% of the Dimensional US Small Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price.

Dimensional US Small Cap High Price-to-Book Index

June 1927–Present: Dimensional US Small Cap High Price-to-Book Index Composition: A subset of the US Small Cap Index. The subset is defined as companies whose relative price is in the top 25% of the US Small Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The Eligible Market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: Non-US companies, REITs, UITs, and investment companies. Source: CRSP and Compustat.

Dimensional US Small Cap Growth Index

Compiled by Dimensional from CRSP and Compustat data. Composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations in the lowest 8% of the total market capitalization whose relative price is in the top 50% of all small cap companies after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes companies with higher profitability. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to December 2012.

Dimensional US Large Cap Value Index

January 1975–Present: Compiled by Dimensional from CRSP and Compustat data. Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations above the 1,000th-largest company whose relative price is in the bottom 30% of the Dimensional US Large Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes securities with higher profitability, lower relative price, and lower market capitalization. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to March 2007. The calculation methodology for the Dimensional US Large Cap Value Index was amended on January 1, 2014, to include direct profitability as a factor in selecting securities for inclusion in the index.

June 1927–December 1974: Targets securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations above the 1,000th-largest company whose relative price is in the bottom 20% of the Dimensional US Large Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price.

Dimensional US Large Cap High Price-to-Book Index

June 1927–Present: Dimensional US Large Cap High Price-to-Book Index Composition: A subset of the US Large Cap Index. The subset is defined as companies whose relative price is in the top 20% of the US Large Cap Index after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The Eligible Market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: Non-US companies, REITs, UITs, and investment companies. Source: CRSP and Compustat.

Dimensional US Large Cap Growth Index

Compiled by Dimensional from CRSP and Compustat data. Composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market with market capitalizations above the 1,000th name whose relative price is in the top 50% of all large cap companies after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes companies with higher profitability, lower relative price, and lower market capitalization. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has

been retroactively calculated by Dimensional and did not exist prior to December 2012.

Dimensional International Small Cap Index

January 1994–Present: Compiled by Dimensional from Bloomberg securities data; market capitalization-weighted index of small company securities in the eligible markets excluding those with the lowest profitability and highest relative price within the small cap universe. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Exclusions: REITs and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to April 2008. The calculation methodology for the Dimensional International Small Cap Index was amended in January 2014 to include direct profitability as a factor in selecting securities for inclusion in the index.

July 1981–1993: Created by Dimensional; includes securities of MSCI EAFE countries in the bottom 10% of market capitalization excluding the bottom 1%. All securities are market capitalization-weighted. Each country is capped at 50%; rebalanced semiannually.

January 1970–June 1981: 50% Hoare Govett Small Companies Index, 50% Nomura Small Companies Index.