

# Micro-Cap Investing

## Expanding the Opportunity Set

Micro-cap stocks present a unique opportunity for long-term investors. Defined as companies whose market capitalizations range from approximately \$9 million to \$3,608<sup>1</sup> million, micro-cap stocks often fall under investors' radar screens. But what these companies lack in size, we believe they make up for in potential, including:

- Compelling risk-adjusted returns over the long term
- Low correlation with other asset classes
- An effective tool for portfolio diversification
- A potential opportunity to invest in overlooked, undervalued stocks

At Denver Investments, we seek to capitalize on inefficiencies in the micro-cap universe through a quantitative approach that draws upon over 25 years of quantitative research experience. The approach utilizes sector-specific modeling based on proprietary factors, which are enhanced by insights from the portfolio manager. The portfolio manager believes this allows him to more accurately identify factors with predictive value in order to gain an information advantage in identifying attractively valued micro-cap stocks.

### Expanding the Investment Opportunity Set

Given their unique characteristics, we believe micro-cap stocks offer an expanded opportunity set that goes beyond the traditional equity universe of large-, mid- and small-capitalization companies. However, it is important to understand that micro-cap stocks are not "pink sheets."<sup>2</sup> They trade on major stock exchanges and are therefore subject to applicable SEC regulations. Although roughly half of all publicly traded U.S. stocks are micro-caps, these securities are relatively under-researched by the sell-side analyst community as compared to better known, large-cap companies. When examined from an analyst-to-stock ratio, research for micro-cap stocks is surprisingly low, with an average of two analysts covering each micro-cap stock compared to 21 analysts for each large-cap stock.<sup>3</sup> Said differently, 48% of micro-cap companies are followed by one

<sup>1</sup>Index membership and rankings for the Russell Microcap® Index determined using total market capitalizations as of December 31, 2016.

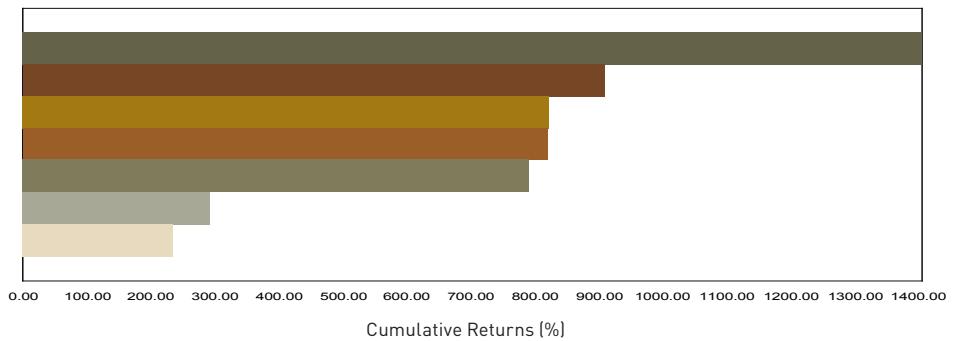
<sup>2</sup>Pink sheets are a daily publication compiled by the National Quotation Bureau with bid and ask prices of over-the-counter (OTC) stocks and the dealers that exchange them. Unlike companies on a stock exchange, companies quoted on the pink sheets system do not need to meet minimum requirements or file with the SEC.

<sup>3</sup>Source: FactSet. As of December 31, 2016.

or fewer analysts while 1% of large-cap stocks have one or fewer analysts.<sup>3</sup> We believe this lower coverage may lead to inefficiencies and the potential for less researched companies to provide greater risk-adjusted returns than more researched companies over time.

The historical long-term performance of this asset class illustrates that micro-caps outperformed other market indices since the inception of the Dow Jones U.S. Micro Cap Index on 1/1/1992. We believe this outperformance demonstrates the potential benefits of micro-caps due to their potential for higher earnings growth, leaner operations and the ability to respond more quickly to changing market dynamics.

**Micro-Caps Outperformed Over Time  
Cumulative Returns 1/1/1992 - 12/31/2016**



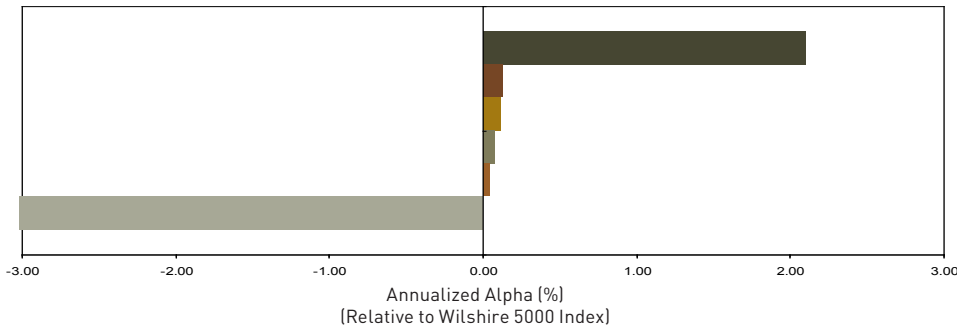
	Cumulative Returns
■ Dow Jones U.S. Micro Cap Index	1,405.9%
■ Russell 2000® Index	908.7
■ Russell 1000® Index	823.2
■ Russell 3000® Index	820.7
■ S&P 500® Index	792.1
■ Barclays U.S. Aggregate Bond Index	293.7
■ MSCI EAFE-GD Index	235.0

Source: Morningstar. Performance data quoted represents past performance and does not guarantee future results.

We believe micro-cap stocks offer opportunities to find growth where others are not looking, to expand and diversify investment options, and the ability to take advantage of stocks that, because they are underfollowed by Wall Street, may be inefficiently priced. Nonetheless, a common criticism of these stocks is that, because of their relatively low liquidity and trading volumes, their risk-reward ratio is uninspiring. The following table may cause investors to think twice before dismissing micro-caps for their perceived higher risk, showing that the Alpha<sup>4</sup> for this asset class is actually higher relative to other equity asset classes when compared to the overall market.

<sup>4</sup>Alpha is a measure of performance on a risk-adjusted basis. Alpha takes the volatility (price risk) of a portfolio and compares its risk-adjusted performance to a benchmark index. The excess return of the portfolio relative to the return of the benchmark index is a portfolio's alpha.

**Micro-Caps Delivered Strong Risk-Adjusted Returns  
Annualized Alpha 1/1/1992 - 12/31/2016**



Annualized Alpha	
■ Dow Jones U.S. Micro Cap Index	2.10%
■ Russell 2000® Index	0.13
■ Russell 1000® Index	0.11
■ S&P 500® Index	0.08
■ Russell 3000® Index	0.04
■ MSCI EAFE-GD Index	-3.02

Source: Morningstar. Performance data quoted represents past performance and does not guarantee future results.

The relative attractiveness of less liquid stocks, such as micro-caps, was the topic of a research report by Roger Ibbotson, founder of Ibbotson Investment Research. Between 1972 and 2009, illiquid stocks outperformed more liquid stocks across all market cap ranges. Most notably, the equities with the largest gains were the least liquid smaller-cap concerns, which generated an astonishing 17.87% annual return for nearly four decades.<sup>5</sup> This data suggests that, while thinly traded stocks can present challenges for short-term investors, they can deliver attractive performance for long-term investors.

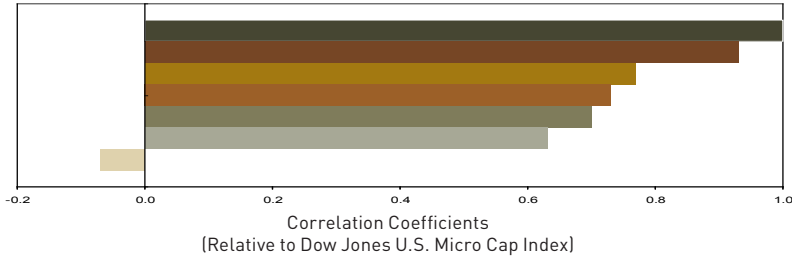
**Micro-Cap Stocks As An Important Asset Allocation Tool**

Micro-caps are also a worthy consideration for investors looking to further diversify their portfolios, with the goal of improving overall return while reducing risk. They possess different risk and performance characteristics that allow them to have low correlations with other asset classes. Consider the Dow Jones U.S. Micro Cap Index, for example, which has a correlation<sup>6</sup> of 0.70 with the S&P 500® Index for the period.

<sup>5</sup>Liquidity As An Investment Style, Zhiwu Chen & Roger Ibbotson, Sept. 10, 2010.

<sup>6</sup>Correlation is a statistical measure of how two securities or indices move in relation to each other. Correlation is computed into what is known as the correlation coefficient, which ranges between -1 and +1. Perfect positive correlation [a correlation co-efficient of +1] implies that as one security moves, either up or down, the other security will move in lockstep, in the same direction. Alternatively, perfect negative correlation means that if one security moves in either direction the security that is perfectly negatively correlated will move in the opposite direction.

**Micro-Caps Offer Low Correlation to Other Equity Asset Classes**  
**Correlation Coefficients 1/1/1992 - 12/31/2016**

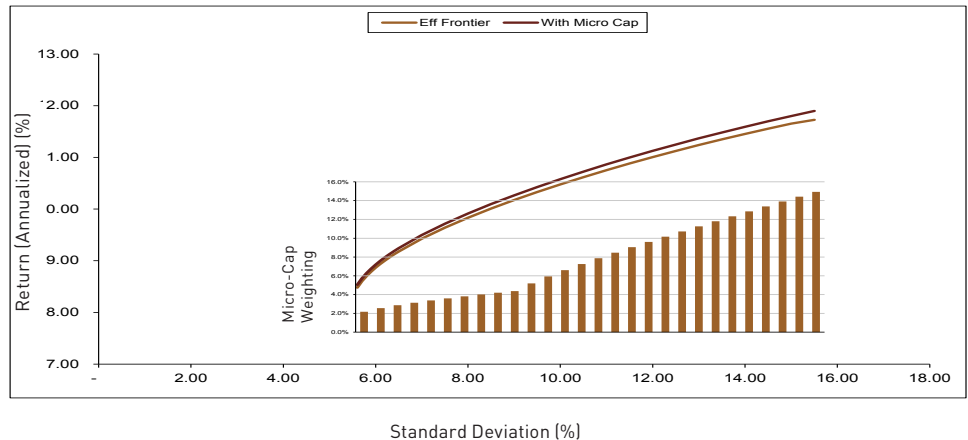


■ Dow Jones U.S. Micro Cap Index	1.00
■ Russell 2000® Index	0.93
■ Russell 3000® Index	0.77
■ Russell 1000® Index	0.73
■ S&P 500® Index	0.70
■ MSCI EAFE-GD Index	0.63
■ Barclays U.S. Aggregate Bond Index	-0.08

Source: Morningstar. Performance data quoted represents past performance and does not guarantee future results.

The correlation characteristics of micro-cap stocks suggest that adding these securities to a typical balanced portfolio can improve overall returns without a subsequent increase in portfolio risk, as shown in the chart below.

**Micro-Caps Stocks Can Enhance a Portfolio's Risk-Adjusted Returns Over the Long-Term<sup>7</sup>**  
**12/31/1978 - 12/31/2016**



<sup>7</sup>The efficient frontier is based on the actual index returns of the S&P 500®, Russell 2000® Index, MSCI EAFE® and the Barclays Capital Aggregate (formerly Lehman Brothers Aggregate) Bond Index from 12/31/1978 to 12/31/2016. For each given standard deviation an optimal portfolio is created to maximize return and those returns are plotted on an X/Y axis. The efficient frontier with micro-cap repeats the calculation adding the micro-cap benchmark to the optimization model. The insert shows the allocation towards micro-cap at the optimal level. Micro-Cap Benchmark source: Kenneth French [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). The Micro-Cap Benchmark consists of the monthly returns of the bottom half of exchange traded securities weighted by market capitalization. Transaction costs are ignored. The performance results illustrated do not represent portfolio performance and past performance does not guarantee future results.

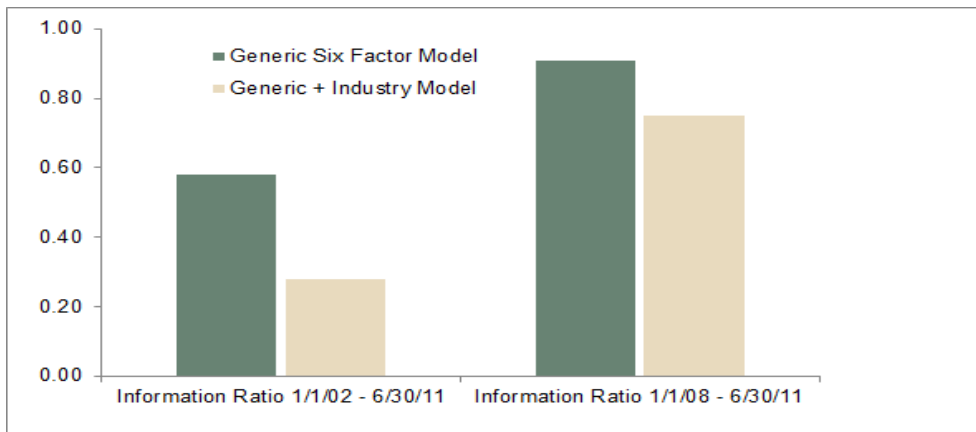
**Disciplined Analysis for Dynamic Stocks**

Of course, before investing in attractively valued micro-cap stocks, one must first be able to identify them. Within the micro-cap arena, where the sheer number of stocks and the high cost of fundamental research make qualitative research difficult, a quantitative approach can be successful at singling out underpriced stocks.

Within the micro-cap universe, where the continuous evolution of small companies and arrival of new companies make it challenging to keep up with the changing dynamics, qualitative research is that much harder. It is frequently the case that, by the time an analyst finally understands a company’s business model, the model has changed. By contrast, the disciplined and repeatable processes of quantitative analysis can offer consistent, long-term clarity and focus. It can also remove biases from the research process, evaluating companies strictly on hard facts versus human opinion.

Quantitative approaches used by micro-cap managers are often based on multi-factor models, which historically have demonstrated success at drawing measurable connections between the variables and the resulting behavior and performance of stocks. However, multi-factor models tailored to a specific industry have an even higher probability of accurately forecasting a stock’s behavior when compared to generic, “one-size-fits-all” multi-factor models, as shown in the charts that follow.

**Industry-Specific Model Generated Higher Information Ratio vs. Generic Model**  
**Portfolio Information Ratio Comparison 1/1/2002 - 6/30/2011<sup>8</sup>**

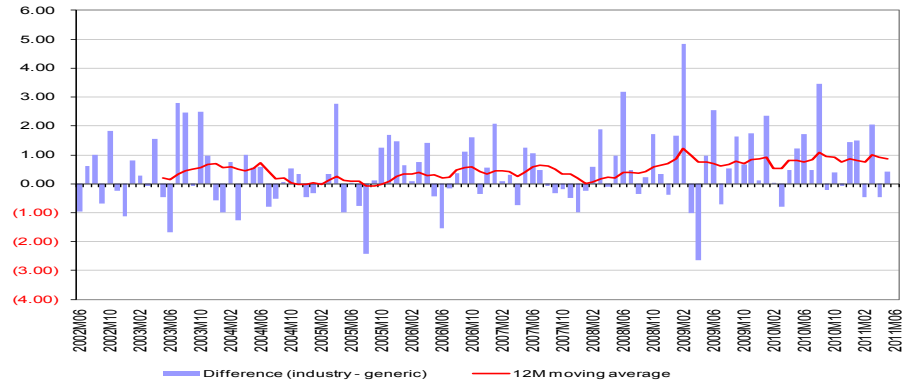


The chart above shows that the industry-specific factor model delivered stronger risk-adjusted returns than the six-factor generic model over both short- (i.e., 3.5 years) and long-term (i.e., 9.5 years) periods.

<sup>8</sup> Source: Deutsche Bank, *DB Quant Handbook 2010, Year of the Tiger*, 10 December 2010. The six-factor model uses six generic factors, equally weighted. The six factors were chosen from each one of the major style buckets: value, growth, momentum, sentiment, quality and technical. The industry-specific model adds, to the generic model, an industry-specific factor for each of 12 industries. These industries include airlines, gaming, healthcare facilities, homebuilding, lodging, managed care, mining, oil & gas, oil refining, retail, semiconductor, and bank & thrift. Results reflect two real portfolios with the following constraints: long/short market neutral strategy, target annualized volatility of 8% per year, turnover constrained at 25% one-way per month (or 300% one-way per year), and dollar, beta and sector neutral.

Information ratio is a ratio of portfolio returns above the returns of a benchmark (usually an index) to the volatility of those returns. The ratio measures a portfolio manager’s ability to generate excess returns relative to a benchmark, but also attempts to identify the consistency of the manager.

**Industry-Specific Model Delivered Relative Outperformance vs. Generic Model Return Differential**  
**Industry Model vs. Generic Model 6/30/2006 - 6/30/2011<sup>9</sup>**



**Denver Investments' Micro-Cap Strategy**

Quick Facts

- Diversified stock portfolio of 150 - 200 names
- Quantitative approach to stock picking
- Multi-factor, sector-specific models developed in conjunction with fundamental analyst team
- Sector weights of +/- 3% of Russell Microcap<sup>®</sup> Index weights

Portfolio Management

- Paul Kuppinger, CFA  
Quantitative Analyst
- 27 years of experience

*The above portfolio construction guidelines represent typical investment parameters.*

The chart above shows (via the blue bars) the return difference between the industry-specific model and the generic model. The 12-month moving average (i.e., red line) shows the excess return generated by the industry-specific model over the five years from July 2006 through June 2011.

**Denver Investments' Advantage**

Denver Investments' Micro-Cap Strategy draws upon the more than 25-year history of quantitative equity analysis. With this as our foundation, we've developed a rigorous and structured investment process that relies on multi-factor, sector-specific quantitative modeling, with the objective of capitalizing on inefficiencies in the micro-cap market.

- A disciplined, quantitative approach
- 16 uniquely designed sector models, with factors that combine qualitative and quantitative insights

The quantitative strength behind the Micro-Cap Strategy lies in the uniquely defined sector models that the strategy's manager builds and relies on for stock selection. Each model utilizes proprietary factors that are distinct to a particular industry and shaped by input from the firm's fundamental analysts. The portfolio manager believes this approach to modeling prevents data mining and "formula fitting" and allows for true stock picking. Further, the portfolio manager believes that incorporating fundamental insights into factors used in the modeling process allows him to more accurately identify factors with predictive value and gain an information advantage in identifying micro-cap stocks with attractive risk/reward potential.

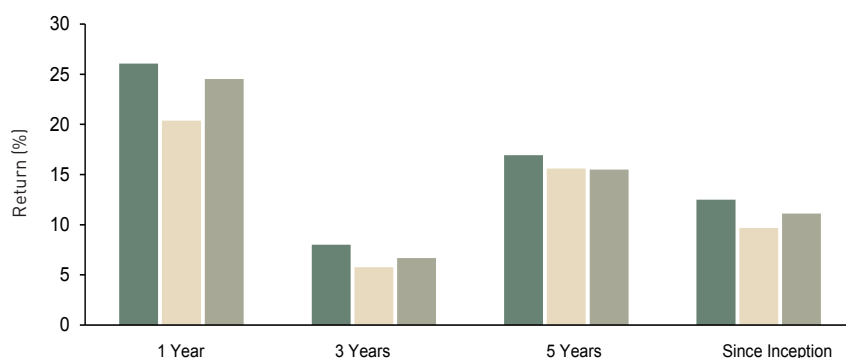
<sup>9</sup>Source: Deutsche Bank, DB Quant Handbook 2010, Year of the Tiger, 10 December 2010. The six-factor model uses six generic factors, equally weighted. The six factors were chosen from each one of the major style buckets: value, growth, momentum, sentiment, quality and technical. The industry-specific factor model adds, to the generic model, an industry-specific factor for each of 12 industries. These industries include airlines, gaming, healthcare facilities, homebuilding, lodging, managed care, mining, oil & gas, oil refining, retail, semiconductor, and bank & thrift. Results reflect two real portfolios with the following constraints: long/short market neutral strategy, target annualized volatility of 8% per year, turnover constrained at 25% one-way per month (or 300% one-way per year), and dollar, beta and sector neutral.

Given the importance of liquidity in the micro-cap universe, the manager considers stocks for investment that have a price of at least \$1.00 a share and an average daily trading volume of at least \$400,000. The product only invests in stocks for which the portfolio manager is confident he can accumulate a full position size (85 basis points) within two weeks. The manager also follows a strict risk discipline, including portfolio construction guidelines, proprietary and third-party analysis of portfolio risks, and monitoring and controlling tracking error.

The effectiveness of this unique research process is demonstrated by the strong relative performance of the Micro-Cap Strategy.

To learn more about our approach to micro-cap investing, please contact Institutional Marketing at 303.312.5000.

**Denver Investments' Micro-Cap Strategy  
Annualized Returns (%)  
Periods Ending December 31, 2016**



	1 Year	3 Years	5 Years	Since Inception
Micro-Cap (gross)	26.05	8.02	16.92	12.50
Micro-Cap (net)	24.51	6.69	15.49	11.10
Russell Microcap® Index	20.37	5.77	15.59	9.68

*Denver Investments claims compliance with the Global Investment Performance Standards (GIPS®). Information is considered Supplemental Information to the GIPS compliant presentation for this strategy. A client's actual return will be reduced by the advisory fees and any other expenses which may be incurred in the management of an investment advisory account. As an example, an account with an initial \$10,000.00 investment on 1/1/2012, earning a recurring 1.25% quarterly gross return (5.09% annualized), and paying a 0.25% quarterly management fee (1.00% annual fee) would have grown to \$12,820.37 on a gross of fees basis and \$12,201.90 on a net of fees basis by 12/31/2016 (5 years). Time periods greater than one year are annualized. Past performance does not guarantee future results, and future performance may be lower or higher than the performance presented.*

Investing in micro-cap stocks generally will be more volatile and loss of principal could be greater than investing in large-cap funds.

Denver Investments' Micro-Cap Strategy is available in a separately-managed account and a mutual fund.

*The mountain logo together with "Denver Investments" is a registered service mark of Denver Investments.*

### **INDEX DESCRIPTIONS**

*All indices are unmanaged and investors cannot invest directly in an index.*

**Russell 1000® Index** measures the performance of the large-cap segment of the U.S. equity universe. It is a subset of the Russell 3000® Index and includes approximately 1000 of the largest securities based on a combination of their market cap and current index membership. The Russell 1000 represents approximately 92% of the U.S. market.

**Russell 2000® Index** measures the performance of the small-cap segment of the U.S. equity universe. The Russell 2000 is a subset of the Russell 3000® Index representing approximately 10% of the total market capitalization of that index. It includes approximately 2000 of the smallest securities based on a combination of their market cap and current index membership.

**Russell 3000® Index** measures the performance of the largest 3000 U.S. companies representing approximately 98% of the investable U.S. equity market.

**Russell Microcap® Index** measures the performance of the microcap segment of the U.S. equity market. Micro-cap stocks make up less than 3% of the U.S. equity market (by market cap) and consist of the smallest 1,000 securities in the small-cap Russell 2000® Index, plus the next smallest eligible securities by market cap.

**Dow Jones U.S. Micro Cap Index** is a subset of the Dow Jones U.S. Total Stock Market Index, which measures all U.S. equity securities with readily available prices. It represents stocks ranked below 2,500 by size. It is float market-cap weighted.

**MSCI EAFE Index** is a free float-adjusted market capitalization index that is designed to measure the equity market performance of 22 developed markets, excluding the U.S. & Canada.

**S&P 500® Index** is an index of 500 stocks chosen for market size, liquidity and industry grouping, among other factors. It is a market-value weighted index (stock price times number of shares outstanding), with each stock's weight in the Index proportionate to its market value.

**Wilshire 5000 Index** is a market-capitalization-weighted index of the market value of all stocks actively traded in the United States. It represents the broadest index for the U.S. equity market, measuring the performance of all U.S. equity securities with readily available price data.

**Barclays U.S. Aggregate Bond Index** is a fixed income, market-value-weighted index generally representative of investment grade fixed-rate debt issues, including government, corporate, asset-backed, and mortgage-backed securities with maturities of at least one year.

FOR MORE INFORMATION ABOUT OUR INSTITUTIONAL OFFERING, PLEASE CONTACT:

Denver Investments | Republic Plaza | 370 17th Street | Suite 5000 | Denver, Colorado 80202

p: 303.312.5000 | e: [marketing@denvest.com](mailto:marketing@denvest.com) | [www.denvest.com](http://www.denvest.com)