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The Impact of Implementing Profitability in Equity Strategies: A Four-Year Study

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Dimensional uses current market prices, balance sheet data, and income statement data to discern differences in expected returns among stocks. Our equity strategies pursue the market, size, value, and profitability premiums globally. Profitability was broadly incorporated into our strategy design in 2013.[1]

In this paper, using data from 2014 to 2017, we study the difference in returns between two sets of all-cap core, small cap, and value strategy simulations that have a similar focus on the market, size, and value premiums but where one set ("without profitability") does not incorporate profitability considerations while the other set ("with profitability") does. Although the sample period is relatively short, the study helps illustrate the impact of profitability considerations.

DIMENSIONAL STUDY

In 2013, Dimensional enhanced the structure of our equity strategies to incorporate a focus on the profitability premium. The profitability-related enhancements were part of Dimensional's continual efforts to improve the expected return potential of our investment solutions and one of the more recent additions to the diverse set of value-enhancing implementation strategies we apply throughout the investment process. The design and management of our strategies take many considerations into account, including size, value, momentum, diversification, trading costs, securities lending, etc. We may also apply caps on strategy weights at the stock, sector, and country levels. In addition, our live strategies use a flexible trading approach and rebalance continuously using information about expected returns in current market prices and the latest company financials.

To be able to isolate the impact of profitability from the effects of other portfolio considerations, we run two sets of simulations—one that focuses on size, value, and profitability and a second that

1. Profitability is defined as operating profits before depreciation and amortization less interest expense, scaled by book equity.

only focuses on size and value. The simulated strategies are rebalanced annually in a quarterly staggered manner using monthly returns and financial data from CRSP, Compustat, and Bloomberg. The goal of running the simulated strategies in this way is to isolate the differences in performance that resulted solely from the integration of profitability. The performance of the simulations presented in this paper are hypothetical and backtested and are not representative of actual results. The remainder of the paper describes the simulated results grouped by types of equity strategies.

ALL-CAP CORE STRATEGIES

Dimensional's all-cap core equity strategies account for profitability in two ways. First, we overweight stocks of higher-profitability firms and underweight stocks of lower-profitability firms relative to their market cap weights across the universe in a measured and controlled way. By emphasizing higher-profitability stocks through a weighting schema that keeps strategy weights proportional to market cap weights, we seek to improve expected returns while incorporating the latest information embedded in current prices and minimizing unnecessary turnover.

The second way in which we incorporate the profitability premium in our all-cap core strategies is by excluding small cap stocks that have high relative prices and low profitability, which historically have delivered particularly low average returns as documented in literature and observed in our research.[2]

ALL-CAP CORE SIMULATIONS

To evaluate the impact of profitability on simulated all-cap equity strategies, we compare the performance of simulated all-cap core strategies that have a similar focus on the market, size, and value premiums but where one set of strategies does not incorporate profitability considerations while the second set does. **Exhibit 1** shows the performance of simulated with- and without-profitability all-cap strategies in the US with varying tilts to the market, size, value, and profitability premiums.

For the US all-cap core tilt 1 and 2 simulations, we observe positive effects of the added profitability considerations for the period, which is in line with the outperformance of higher-profitability stocks over lower-profitability stocks in the overall US market during the four-year period.

While the overall performance of higher-profitability stocks was positive in the US, different segments of the market made different contributions. For example, during the four-year period, within large caps, higher-profitability stocks outperformed lower-profitability stocks in the large cap growth segment but not in the large cap value segment, with the biggest underperformance being in the deepest value segment. This explains the negative impact of the profitability considerations on the all-cap core tilt 3 simulation, which excluded mega cap growth stocks and emphasized large cap deepest value stocks more strongly than the other two simulations.

Exhibit 1: Performance of US All-Cap Core Simulations With and Without Profitability Considerations

Hypothetical Annualized Compound Returns	Without Profitability Considerations	Exclusions	With Profitability Considerations
US All-Cap Core 1 Simulation	11.1%	5.1%	11.2%
US All-Cap Core 2 Simulation	10.5%	5.1%	10.6%
US All-Cap Core 3 Simulation	9.5%	5.1%	9.4%

Simulated data for research purposes only to illustrate the impact of profitability-related considerations on simulations. This does not reflect actual performance of a live or proposed Dimensional strategy or portfolio. Results of an actual account or investment may vary significantly. Simulated returns are hypothetical, are subject to numerous limitations, and do not reflect costs or fees associated with an actual investment. The simulations without profitability considerations are market-wide (large, mid, and small cap) simulations that include all eligible stocks at their market cap weights and emphasize small cap and value (lower-relative price) stocks. The simulations with profitability considerations are constructed similarly, but they also emphasize higher-profitability stocks and exclude small cap stocks with high relative prices and low profitability. The exclusions column shows the simulated performance of these excluded stocks. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. The hypothetical monthly returns are computed as the simple average of the monthly returns on four simulations rebalanced annually at the beginning of each quarter. REITs and investment companies are excluded from the universe. The US all-cap core tilt 1, 2, and 3 simulations differ in their emphasis on size, value, and, in the case of the with-profitability simulations, profitability. The US all-cap core tilt 2 simulation has a higher emphasis on the size, value, and profitability premiums than the US all-cap core tilt 1 simulation. The US all-cap core tilt 3 simulation emphasizes the size and value premiums more than the US all-cap core tilt 1 and 2 simulations and excludes large cap growth stocks where the other two simulations do not. The returns are based on model backtests and were achieved with the benefit of hindsight. Past performance, including simulated performance, is no guarantee of future results. Sources: Dimensional, using CRSP and Compustat data. See Appendix "Important Disclosures" for important information on simulated performance. Start date (January 2014) is based on when Dimensional had fully integrated the profitability premium in equity strategies.

2. See Eugene F. Fama and Kenneth R. French, "A Five-Factor Asset Pricing Model," *Journal of Financial Economics* 116, no.1 (April 2015): 1–22 and *Quarterly Institutional Review* (QIR), Dimensional Fund Advisors, 1Q10 and 2Q12.

Exhibit 2: Performance of Developed ex US and Emerging Markets All-Cap Core Simulations With and Without Profitability Considerations

Hypothetical Annualized Compound Returns	Without Profitability Considerations	Exclusions	With Profitability Considerations
Developed ex US All-Cap Core Simulation	6.6%	−1.6%	7.0%
Emerging Markets All-Cap Core Simulation	6.9%	−0.2%	7.2%

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The exhibit also shows the performance of small, growth, and low-profitability stocks that were excluded from the with-profitability simulations. Consistent with historical observations, these stocks significantly underperformed the rest of the market in this period. Even though these stocks represent a small fraction of the market, the exclusion helped the performance of these simulations.

How about outside the US? **Exhibit 2** shows the same comparison in developed ex US and emerging markets. Our simulations suggest that the profitability considerations had positive effects of approximately 40 basis points (bps) and 30bps per year on the developed ex US and emerging markets all-cap core simulations, respectively. The outperformance is partially driven by the large underperformance of small, growth, and low-profitability stocks, which were excluded from the with-profitability simulations. In addition, over the sample period, higher-profitability stocks generally outperformed lower-profitability stocks in these markets, and hence, the overweighting of higher-profitability stocks also helped drive the relative outperformance of the with-profitability simulations.

SMALL CAP STRATEGIES

In Dimensional's small cap strategies, we target the profitability premium through the exclusion of growth and low-profitability stocks, as discussed earlier. In targeting the profitability premium within small caps, we generally use only a selection approach, where we target subsets of stocks in the pursuit of higher expected returns, as deviating from market capitalization weights would require additional turnover, which tends to be more costly for stocks with lower market capitalizations.

SMALL CAP SIMULATIONS

Exhibit 3 compares the performance of simulated with- and without-profitability small cap strategies for US, developed ex US, and emerging markets. The difference between the with- and without-profitability small cap simulations is the exclusion of growth and low-profitability stocks. The improvement in the hypothetical annualized compound returns from applying the exclusion is 30bps across the regions for the period from January 2014 to December 2017. During that period, we observe large underperformance of the stocks excluded in the simulations due to the profitability considerations relative to the rest of the small cap universe.

SMALL CAP VALUE STRATEGIES

Dimensional's small cap value strategies focus on small cap stocks with price-to-book ratios in the bottom 35% of the small cap market. As with our small cap strategies, our small cap value strategies use a selection approach to pursue the profitability premium. In particular, we exclude the lowest profitability stocks from the small cap value universe.

SMALL CAP VALUE SIMULATIONS

The simulated performance of small cap value strategies with and without profitability considerations is shown in **Exhibit 4** for US and developed ex US markets. In the with-profitability simulations, the lowest profitability stocks are carved out of the small cap value universe.

Exhibit 3: Performance of US, Developed ex US, and Emerging Markets Small Cap Simulations With and Without Exclusion of Growth and Low-Profitability Stocks

Hypothetical Annualized Compound Returns	Without Profitability Considerations	Exclusions	With Profitability Considerations
US Small Cap Simulation	8.5%	5.1%	8.8%
Developed ex US Small Cap Simulation	8.7%	−1.6%	9.0%
Emerging Markets Small Cap Simulation	8.1%	−0.2%	8.4%

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As seen in the exhibit, the estimated value-add from the profitability considerations is 50bps for the US and 40bps for the developed ex US simulations for the four-year period. These positive contributions of the profitability considerations reflect the large underperformance of the excluded stocks with respect to the rest of the small cap value stocks.

LARGE CAP VALUE AND ALL-CAP VALUE STRATEGIES

In Dimensional's large cap value and all-cap value strategies, we implement profitability by using both the selection and weighting approaches. We exclude the lowest profitability stocks from the relevant value universe and emphasize the stocks with lower market capitalizations, lower relative prices, and higher profitability within the remaining value universe.

LARGE CAP VALUE AND ALL-CAP VALUE SIMULATIONS

In **Exhibit 5**, the performance of the simulated with-profitability value strategies is compared to that of the equivalent simulated without-profitability strategies. The profitability considerations had generally positive effects in the simulations, ranging from 40bps to 60bps, depending on the region. In the US, the underperformance of the excluded stocks provides a partial explanation for the outperformance of the with-profitability simulation. The return differences between the with- and without-profitability simulations in these markets are also driven by the weighting approach.

During the four-year period, in a plain US large value simulation without profitability considerations and

Exhibit 4: Performance of Small Cap Value Simulations With and Without Exclusion of Lower-Profitability Stocks

Hypothetical Annualized Compound Returns	Without Profitability Considerations	Exclusions	With Profitability Considerations
US Small Cap Value Simulation	7.7%	1.9%	8.2%
Developed ex US Small Cap Value Simulation	7.3%	4.7%	7.7%

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Exhibit 5: Performance of Large Cap Value and All-Cap Value Simulations With and Without Profitability Considerations

Hypothetical Annualized Compound Returns	Without Profitability Considerations	Exclusions	With Profitability Considerations
US Large Cap Value Simulation	10.2%	6.0%	10.8%
Non-US Developed Large Cap Value Simulation	5.0%	6.0%	5.6%
Emerging Markets All Cap Value Simulation	5.5%	1.8%	5.9%

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without sector caps, the financial sector would have been overweighted by more than 10% relative to the sector weight of a plain large cap market simulation. Applying a profitability emphasis would have reduced the overweight to financials as they had lower profitability relative to the rest of the large cap value market. Since financials outperformed the rest of the large cap value stocks, in a large cap value simulation without sector constraints we would have observed a negative impact from the overweighting of higher-profitability stocks and hence the reduced weight of the financial sector. However, the large cap value simulations in Exhibit 5 incorporate dynamic sector caps limiting the overweight of any sector to 10% of the sector weight in the size-eligible market. These caps were binding for financials in both the with- and without-profitability large cap value simulations. Therefore, the overweighting of higher-profitability stocks did not result in an underweight to financials and ended up contributing positively to the performance of the US large cap value with-profitability simulation.

In the emerging markets simulation, we also observe underperformance of the excluded stocks and overall positive contribution of the profitability considerations. In the developed ex US markets, higher-profitability stocks generally also outperformed lower-profitability stocks in the large cap value segment. However, the stocks excluded due to profitability considerations had relatively high returns. And yet the overall net effect of incorporating profitability considerations in the developed ex US large cap value simulation ended up positive over the sample period.

CONCLUSIONS

Valuation theory and rigorous empirical research suggest that profitability contains information about differences in expected returns across stocks beyond the information contained in company size and relative price. Therefore, by incorporating a focus on the profitability premium in solutions that already focus on the size and value premiums, investors can pursue higher expected returns in a more reliable manner. In 2013, Dimensional started incorporating profitability across our equity strategies accounting for the tradeoffs among competing premiums, costs, and diversification.

In this study, we simulated the impact of profitability by comparing the performance of simulations that do and do not incorporate profitability. Over the four-year period ending in December 2017, the simulated strategies with profitability considerations mostly outperformed the simulated strategies without such considerations. Although a four-year sample period is short, the simulation results shown here, together with the ample empirical evidence[3] on the pervasiveness and persistence of the profitability premium, suggest that integrating the profitability dimension into the structure of Dimensional equity strategies may increase the expected return potential of those strategies in a systematic, transparent, and reliable manner.

3. See Eugene F. Fama and Kenneth R. French, "International Tests of a Five-Factor Asset Pricing Model," *Journal of Financial Economics* 123, no. 3 (March 2017): 441-463; Robert Novy-Marx, "The Other Side of Value: The Gross Profitability Premium," *Journal of Financial Economics* 108, no. 1 (April 2013): 1–28; and Sunil Wahal, "The Profitability and Investment Premium: Pre-1963 Evidence," *Journal of Financial Economics*, Forthcoming.

IMPORTANT DISCLOSURES

Simulated returns are based on model/backtested simulations. These are not live strategies managed by Dimensional Fund Advisors LP or any of its affiliates. The performance was achieved with the retroactive application of a model designed with the benefit of hindsight; it does not represent actual investment performance. Backtested model performance is hypothetical (it does not reflect trading in actual accounts) and is provided for informational purposes only. The stocks held in the model may differ significantly from those held in client accounts. Model performance may not reflect the impact that economic and market factors might have had on the advisor's decision-making if the advisor were actually managing client money. Actual management of these types of simulated strategies may result in lower returns than the backtested results achieved with the benefit of hindsight. Backtested performance does not reflect financial risk associated with actual portfolio management. Past performance (including hypothetical past performance) does not guarantee future or actual results. Performance for other time periods not shown may differ significantly.

The simulated performance shown is gross performance, which includes the reinvestment of dividends but does not reflect the deduction of investment advisory fees and other expenses. A client's investment returns will be reduced by the advisory fees or other expenses it may incur. For example, if a 1% annual advisory fee were deducted quarterly and a client's annual return were 10% (based on quarterly returns of approximately 2.41% each) before deduction of advisory fees, the deduction of advisory fees would result in an annual return of approximately 8.91% due, in part, to the compound effect of such fees.

Comments made around general market performance of different types of stocks are based on stocks within the eligible universe that are sorted by profitability, price-to-book, and/or size (market cap) into different groups and are intended to analyze general behaviors of the different types of stocks. When stocks are sorted into different groups, filters are applied to data retroactively with the benefit of hindsight.