

March 2020

## The Case for VMP

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Parametric's Value, Momentum & Profitability (VMP) Strategy represents a factor-based style of investing. The strategy offers exposure to value, momentum, and profitability factors in a single portfolio. All three chosen factors have historically been rewarded in the marketplace and are commonly referred to as smart-beta factors. Empirical evidence supports both risk-based and behavioral reasons for the premium earned by each of these factors. As these underlying reasons are likely to persist in the future, this strategy offers the potential for future long-term outperformance.

In this paper we discuss the motivation behind choosing these three factors and present how to construct the multi-factor portfolio in a risk-efficient way. We also present backtested performance and characteristics of the strategy relative to the broad market index.

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Parametric's Value, Momentum & Profitability Strategy is an alternative to traditional active management. Instead of focusing on company-specific research and developing a concentrated portfolio with high idiosyncratic risk, a factor-based approach displays the investor's desired characteristics in a diversified equity portfolio. But the intuition behind the VMP strategy is very similar to what many active managers do when building their highly concentrated portfolios; their goal is to find profitable stocks that trade at a reasonable level of valuation.

The idea is to invest in inexpensive companies that will generate profits, since such stocks should earn higher profits per dollar of investment. To guard against the possibility that the chosen stocks are cheap because the current level of profitability is unsustainable, the active manager typically imposes additional criteria of recent outperformance. This is done to remove those stocks whose outlooks have been diminished by recent bad news that may be reflected in current prices but not in historical profitability metrics.<sup>1</sup> To replicate this active management style, one could target undervalued and profitable stocks (as reflected in higher Value and Profitability factor exposure) that have demonstrated recent relative outperformance (as reflected in higher Momentum factor exposure).

Parametric offers the VMP strategy for both US and developed markets ex-US equities, plus a small-cap version for US equities. The strategy is generated using a multi-factor bottom-up approach and prefers stocks that offer exposure to all three factors concurrently. We use an optimizer to construct the portfolio in a risk-efficient way by controlling unintended factor exposures, ensuring that exposure to the desired factors is the primary driver of tracking error. We start by evaluating each factor individually from a smart-beta perspective, and then we discuss the benefits of getting exposure to the three factors in a single portfolio.

## Value

Value investing involves buying stocks with low ratios of their prices to various measures of the firm's fundamental value, such as price-to-book, price-to-earnings, and price-to-cash-flow, to name a few. Value stocks are considered cheap because investors pay a lower price per unit for exposure to fundamental metrics. Overwhelming empirical evidence shows that value stocks have historically outperformed the market, which is often referred to as the value premium. Fama and French (1992) show that the value premium exists for US stocks.<sup>2</sup> Capaul, Rowley, and Sharpe (1993) and Fama and French (1998) show that the value premium is pervasive in international markets as well.<sup>3</sup>

There are two broad-based explanations for the existence of a value premium: one risk-based and one behavioral. Fama and French (1998) find evidence supporting the risk-based explanation that value stocks are fundamentally riskier because they load on relative distress risk, which is missed by the standard capital asset-pricing model. Investors price such stocks lower in order to be compensated for taking on this risk. As a result, value stocks have higher expected returns, which in the long run should result in higher average realized returns. On the other hand, Lakonishok, Shleifer, and Vishny (1994) find evidence to support the behavioral explanation that value stocks outperform growth stocks: Investors tend to overextrapolate the higher growth rates of some firms, resulting in stock overpricing, and oversell out-of-favor value stocks that have performed poorly, resulting in underpricing.<sup>4</sup> Both explanations have merit and drive the value premium to varying degrees.

<sup>1</sup> Most profitability metrics, such as return on assets, return on equity, gross profit margins, etc., measure past profitability. A negative external event regarding future profitability will impact the stock price immediately but doesn't change the historical profitability numbers. In the absence of a good relative-price performance screen, if one picks profitable stocks that are cheap, then one would systematically prefer stocks that have been historically profitable but are currently cheap for a reason, such as lower likelihood of sustaining their profitability going forward.

<sup>2</sup> Eugene F. Fama and Kenneth R. French. 1992. "The Cross-Section of Expected Stock Returns." *Journal of Finance* 47, no. 2 (June): 427-465.

<sup>3</sup> Carlo Capaul, Ian Rowley, and William F. Sharpe. 1993. "International Value and Growth Stock Returns." *Financial Analysts Journal* 49, no. 1 (January-February): 27-36; Eugene F. Fama and Kenneth R. French. 1998. "Value versus Growth: The International Evidence." *Journal of Finance* 53, no. 6 (December): 1975-1999.

<sup>4</sup> Josef Lakonishok, Andrei Shleifer, and Robert W. Vishny. 1994. "Contrarian Investment, Extrapolation, and Risk." *Journal of Finance* 49, no. 5 (April): 1541-1578.

## Momentum

Momentum investing involves buying past winners and selling past losers based on relative performance over the past three to 12 months and holding the portfolio for the next three to 12 months. A momentum strategy is profitable if relative performance across stocks persists, which results in past winners outperforming past losers over the subsequent period; this is known as the momentum effect. Jegadeesh and Titman (1993) find evidence for the momentum effect in US stocks, while Rouwenhorst (1998) finds evidence of momentum in international equity markets.<sup>5</sup> Moskowitz and Grinblatt (1999) find that momentum exists across industries, while Asness, Moskowitz, and Pedersen (2013) state that the momentum effect extends to other asset classes such as currencies, commodities, and government bond indexes.<sup>6</sup>

There are many explanations regarding the existence of the momentum effect. Among the risk-based explanations, Asness et al. (2013) state that the momentum effect reflects compensation for bearing liquidity risk, while Dobrynskaya (2015) states that it reflects compensation for bearing extra downside market risk.<sup>7</sup> Among the behavioral explanations, Barberis, Shleifer, and Vishny (1998) state that momentum is driven by underreaction to stock-specific news, which happens because of investors' slowness to update their beliefs in the face of new evidence.<sup>8</sup> Grinblatt and Han (2005) and Frazzini (2006) find that momentum is driven by the disposition effect: the tendency of investors to hold their losing stocks too long and sell their winners too soon.<sup>9</sup> When a stock experiences good news, investors want to sell the stock and lock in the gain, which depresses its price and leads to an underreaction to the good news. Similarly, when a stock experiences bad news, investors are reluctant to sell and realize a loss, leading to less selling pressure and underreaction to bad news.

## Profitability

Profitability investing means buying stocks which demonstrate a high degree of profitability as measured by the gross profit-to-assets ratio. Novy-Marx (2013) finds that gross profitability predicts the cross-section of average returns.<sup>10</sup> Profitable firms have significantly higher returns than unprofitable firms and earn a gross profitability premium. Gross profitability appears to be as powerful as value in predicting future returns; in fact, profitable firms earn higher returns despite having higher valuations. Ball et al. (August 2015) find that net income scaled by book value is as good as gross profitability in predicting future returns.<sup>11</sup> They also find that operating profitability is a better predictor of future returns than gross profitability. Finally, Ball et al. (2015) find that cash-based operating profitability, which excludes accruals, is even more powerful in predicting future returns and earns a higher profitability premium.<sup>12</sup>

Since profitability is a relatively new factor, fewer studies exist to provide explanation for its existence. Fama and French (2015) present a five-factor asset-pricing model that incorporates profitability as a factor related to the cross-section of returns.<sup>13</sup> Novy-Marx (2013) suggests the profitability premium can be explained from a rational pricing perspective as follows: Profitable firms that investors require a higher rate of return to hold should be priced similarly to less profitable firms that investors can accept a lower rate of return to hold. Variation in profitability therefore reflects variation in required rates of return, with higher profitability indicating a higher expected return.

Indirect evidence suggests behavioral biases can explain the profitability premium. Novy-Marx (2013) notes that a four-factor model that incorporates profitability can explain many earnings-related anomalies, such as the post-earnings announcement drift where stock prices continue to drift following earnings surprises. This implies that earnings-related anomalies are, to a certain extent, representations of the profitability factor in different guises.

<sup>5</sup> Narasimhan Jegadeesh and Sheridan Titman. 1993. "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency." *Journal of Finance* 48, no. 1 (March): 65–91; K. Geert Rouwenhorst. 1998. "International Momentum Strategies." *Journal of Finance* 53, no. 1 (February): 267–284.

<sup>6</sup> Tobias J. Moskowitz and Mark Grinblatt. 1999. "Do Industries Explain Momentum?" *Journal of Finance* 54, no. 4 (January): 1249–1290; Clifford S. Asness, Tobias J. Moskowitz, and Lasse Heje Pedersen. 2013. "Value and Momentum Everywhere." *Journal of Finance* 68, no. 3 (June): 929–985.

<sup>7</sup> Victoria Dobrynskaya. "Upside and Downside Risks in Momentum Returns." HSE Working Paper No. WP BRP 50/FE/2015, Higher School of Economics, National Research University, Moscow, 2015.

<sup>8</sup> Nicholas Barberis, Andrei Shleifer, and Robert W. Vishny. 1998. "A Model of Investor Sentiment." *Journal of Financial Economics* 49, no. 3 (January): 307–343.

<sup>9</sup> Mark Grinblatt and Bing Han. 2005. "Prospect Theory, Mental Accounting and Momentum." *Journal of Financial Economics* 78, no. 2 (November): 311–339; Andrea Frazzini. 2006. "The Disposition Effect and the Under-Reaction to News." *Journal of Finance* 61, no. 4 (August): 2017–2046.

<sup>10</sup> Robert Novy-Marx. 2013. "The Other Side of Value: The Gross Profitability Premium." *Journal of Financial Economics* 108, no. 1 (April): 1–28.

<sup>11</sup> Ray Ball, Joseph Gerakos, Juhani T. Linnainmaa, and Valeri V. Nikolaev. 2015. "Deflating Profitability." *Journal of Financial Economics* 117, no. 2 (August): 225–248.

<sup>12</sup> Ray Ball, Joseph Gerakos, Juhani T. Linnainmaa, and Valeri V. Nikolaev. 2015. "Accruals, Cash Flows, and Operating Profitability in the Cross Section of Stock Returns." Chicago Booth Research Paper no. 15–12.

<sup>13</sup> Eugene F. Fama and Kenneth R. French. 2015. "A Five-Factor Asset Pricing Model." *Journal of Financial Economics* 116, no. 1 (October): 1–22.

## Parametric VMP Strategy

While we have provided motivation for investing in value, momentum, and profitability factors individually, along with rational and behavioral reasons regarding their existence, there are important benefits from investing in a VMP strategy that tilts on all three factors concurrently. If stocks that provide exposure to more than one factor outperform stocks that provide exposure to just one factor, the bottom-up approach should boost performance because it prefers stocks that provide exposure to multiple targeted factors. This differs from a top-down approach that invests in a blend of standalone single-factor portfolios and is expected to deliver the average performance across the blend.

Empirical evidence supports the bottom-up multi-factor approach for the VMP strategy. Novy-Marx (2014) finds stocks that are both inexpensive and profitable outperform stocks that are only inexpensive or only profitable.<sup>14</sup> Incorporating profitability measures when investing in value stocks helps investors avoid the “value trap” by avoiding stocks that are cheap because they are unprofitable. Frazzini et al. (2013) find that investing in inexpensive but profitable stocks can be a better investment if the stocks also have positive momentum.<sup>15</sup> They find that the bottom-up multi-factor approach boosts performance of the VMP strategy by more than 1% per year. Incorporating positive momentum reduces the likelihood of investing in profitable stocks that are inexpensive because they are unlikely to sustain their profitability going forward.

Frazzini et al. (2013) also show that investing in the three factors via a single portfolio has diversification benefits and leads to better returns per unit of risk. Their findings hold for both US and international equities. This is unsurprising as others have found that these factors have low correlations with each other. Novy-Marx (2013) shows that profitability strategies are complementary to value strategies and provide an excellent hedge for value strategies. Adding profitability to a value strategy can reduce the strategy’s overall volatility and allow value investors to capture the gross profitability premium without adding any additional risk. Asness et al. (2013) show that value and momentum effects are negatively correlated with each other within and across asset classes.

Overall, the empirical evidence suggests that investing in all three factors concurrently with a bottom-up approach boosts performance while providing diversification, thereby improving returns per unit of risk.

## Parametric VMP model portfolios: Construction and backtested performance

Parametric defines the VMP exposure for each stock by a composite of value, momentum, and profitability factors:

$$\text{VMP exposure} = 40\% \text{ value} + 40\% \text{ momentum} + 20\% \text{ profitability}$$

Profitability gets a smaller weight than value and momentum as it’s a relatively new factor, while value and momentum are well-researched and established factors that have stood the test of time. Frazzini et al. (2013) also assign a smaller weight to profitability when researching VMP strategies. The value, momentum, and profitability factors are based on style-risk factors in Barra’s risk model. Parametric constructs the VMP portfolios in a risk-efficient way: The model portfolios are generated via an optimizer with the objective of maximizing VMP factor exposure subject to constraints on unintended style-risk factors and country, currency, and sector bets. The constraints imposed on the optimizer help ensure that any tracking error risk is primarily taken to gain the desired VMP exposure.

<sup>14</sup> Robert Novy-Marx. 2014. “Quality Investing.” Working paper, University of Rochester.

<sup>15</sup> Andrea Frazzini, Ronen Israel, Tobias J. Moskowitz, and Robert Novy-Marx. “A New Core Equity Paradigm: Using Value, Momentum, and Quality to Outperform Markets.” AQR White Paper, March 2013.

The eligible universe comprises stocks from the S&P Global BMI® universe. The universe is restricted to large- and mid-cap US stocks for the US VMP Strategy, small-cap US stocks for the US VMP Small Cap strategy, and large- and mid-cap stocks from countries in the MSCI EAFE® Index and Canada for the Developed Markets ex-US VMP Strategy. The model portfolios are typically reconstituted semi-annually and may occasionally be reconstituted as needed to bring targeted exposures to desirable levels. Turnover constraints may also be imposed to strike the right balance between the level of exposure to desired factors and the level of turnover incurred to attain them.

Figure 1 shows the backtested performance of the US VMP, US VMP Small Cap, and Developed Markets ex-US VMP strategies from 1997 to 2019. Performance is calculated after deducting an annual management fee of 40 bps. All three VMP portfolios outperformed their respective benchmarks on a net-of-fee basis by around 2% and incurred tracking error of around 4% to 5%. To capture the probability of outperformance associated with investing in the strategy, we calculated the rolling three-year returns on a monthly basis over the sample period. Based on the monthly time series of these rolling three-year returns, we calculated the percentage of times that the VMP portfolio outperformed its benchmark. We see that all three VMP portfolios outperformed their benchmarks approximately 67% to 74% of the time.

Figure 1: Annualized backtested performance of VMP Strategies, 1997–2019

	US VMP	Russell 1000 Index	US VMP Small Cap	Russell 2000 Index	Developed Markets ex-US VMP	MSCI World ex-US Index
Net excess return*	2.03%		2.14%		2.00%	
Volatility	15.58%	15.08%	19.13%	19.56%	16.46%	16.20%
Tracking error	4.10%		4.84%		3.99%	
Information ratio	0.49		0.44		0.50	
Rate of outperformance over rolling three-year periods	67.22%		70.95%		73.86%	

Sources: PPA, Russell, and MSCI, 12/31/2019. Backtested performance is hypothetical and is provided for illustrative purposes. It does not reflect the experience of any investor and should not be relied upon for investment decisions. Actual results may vary and vary substantially from the results presented. There is no guarantee that an investor will achieve the results presented. Performance is presented net of management fees and estimated trading costs and reflects the reinvestment of dividends. It is not possible to invest directly in an index. Indexes are unmanaged and do not reflect the deduction of fees and expenses. All investments are subject to risk of loss. Past performance, actual or simulated, is not indicative of future results.

We also show the rolling three-year annualized net excess returns for the portfolios in figure 2. The interesting observation is the asymmetry in the magnitude of underperformance and outperformance. While the VMP portfolios outperform by 4% or more in many periods, underperformance is generally limited to less than 2% to 3%. This highlights that VMP portfolios provide good benchmark-relative downside protection.

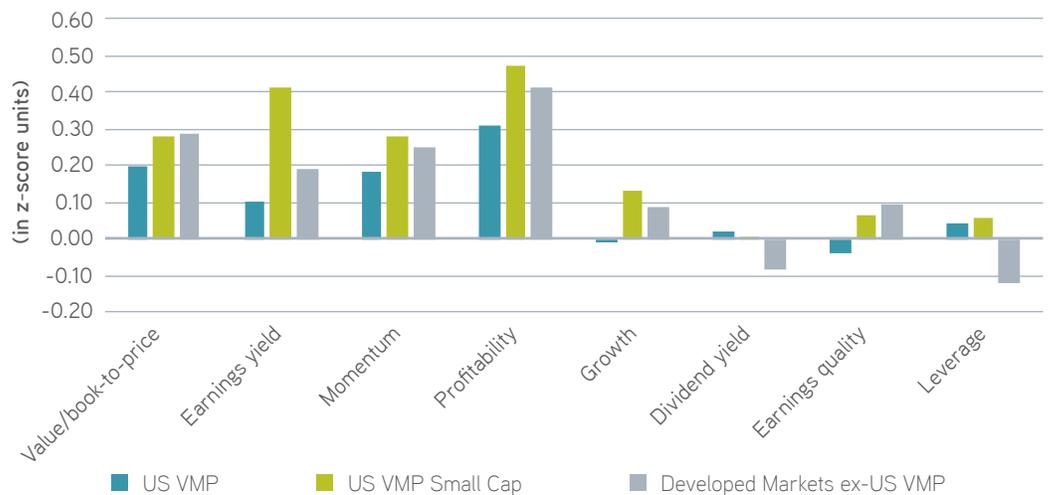
Figure 2: Rolling three-year annualized backtested excess returns (net of fees)



Sources: PPA, Russell, and MSCI, 12/31/2019. Backtested performance is hypothetical and is provided for illustrative purposes. It does not reflect the experience of any investor and should not be relied upon for investment decisions. Actual results may vary from the results presented. Performance is presented net of fees and estimated trading costs and reflects the reinvestment of dividends. It is not possible to invest directly in an index. Indexes are unmanaged and do not reflect the deduction of fees and expenses. All investments are subject to risk of loss. Past performance, actual or simulated, is not indicative of future results.

We also look at the active exposures of the portfolios to the Barra style-risk factors in figure 3. We only show the active exposure to the style-risk factors of interest, namely those that make up the VMP exposure or those likely to be related to it. The portfolios have a positive active exposure to the first four factors in the exhibit that make up the VMP exposure. Exposure to the other risk factors is muted, which illustrates that the constraints imposed during the portfolio construction process helps keep nontargeted exposures in check.

Figure 3: Active exposure to risk factors (model portfolios)



Sources: PPA, Russell, MSCI, Barra, 12/31/2019. Model portfolio data is provided for illustrative purposes. It does not reflect the experience of any actual investor and should not be relied upon to make investment decisions. Actual client holdings and corresponding risk factors will vary from the data presented. All investments are subject to the risk of loss.

## Conclusion

Parametric's VMP Strategy uses a bottom-up approach to provide concurrent exposure to three factors that have historically been rewarded in the marketplace: value, momentum, and profitability. Both rational risk-based reasons and behavioral reasons help explain why there's a premium associated with investing in each of these three factors. Parametric's VMP Strategy offers the opportunity to earn this premium in a risk-efficient manner. The strategy offers exposure to the desired factors while keeping unintended exposures in check.

Based on our research and analysis, we feel strongly that the Parametric VMP Strategy provides good benchmark-relative downside protection and will generally outperform the market net of fees. Due to its risk-efficient construction, investors are more likely to stick with the strategy during inevitable periods of underperformance, which are likely to be small in magnitude and attributable to intentional out-of-favor factor bets. By sticking with the strategy over longer periods, investors are more likely to earn the associated factor-risk premiums.

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Parametric Portfolio Associates LLC ("Parametric"), headquartered in Seattle, is registered as an investment advisor with the Securities and Exchange Commission under the Investment Advisers Act of 1940. Parametric is a leading global asset management firm, providing investment strategies and customized exposure management directly to institutional investors and indirectly to individual investors through financial intermediaries. Parametric offers a variety of rules-based investment strategies, including alpha-seeking equity, fixed-income, alternative, and options strategies. Parametric also offers implementation services, including customized equity, traditional overlay, and centralized portfolio management. Parametric is a wholly owned subsidiary of Eaton Vance Corp. and offers these capabilities through offices located in Seattle, Boston, Minneapolis, New York City, and Westport, Connecticut.

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This material contains hypothetical or simulated performance data, which may not be relied on for investment decisions. Hypothetical performance results have many inherent limitations, some of which are described below.

The US VMP model portfolio was inceptioned on July 1, 2015. Performance presented for January 1, 1997 through June 30, 2015 is back-tested performance. The model portfolio is fully invested and does not maintain any cash. Back-test dividends were reinvested into individual securities (i.e. initial weights are drifted forward, reinvesting dividends). Model dividends are reinvested across entire portfolio (i.e. initial shares do not change). The model return assumes

no additional cash inflows or outflows. The back-test and model data reflect an annual reconstitution in October and assumes that all securities held were available for purchase and sufficiently liquid to achieve the trading activity used by the model. Transactions are executed, without exception, market-on-close; securities are priced by FactSet. Performance is calculated by aggregating security total return times security weight for each security in the portfolio each month. Performance reflects the deduction of management fees (40 bps), the highest fee charged to retail investors, and estimated transaction costs (10 bps). There were no material changes to the investment model during the period presented.

The US VMP Small Cap model portfolio was inceptioned on July 1, 2015. Performance presented for January 1, 1997 through June 30, 2015 is back-tested performance. The model portfolio is fully invested and does not maintain any cash. Back-test dividends were reinvested into individual securities (i.e. initial weights are drifted forward, reinvesting dividends). Model dividends are reinvested across entire portfolio (i.e. initial shares do not change). The model return assumes no additional cash inflows or outflows. The back-test data reflects an annual reconstitution in October. Model data reflects an annual constitution in October and one semi-annual reconstitution in April 2018. Hypothetical data assumes that all securities held were available for purchase and sufficiently liquid to achieve the trading activity used by the model. Transactions are executed, without exception, market-on-close; securities are priced by FactSet. Performance is calculated by aggregating security total return times security weight for each security in the portfolio each month. Performance reflects the deduction of management fees (40 bps), the highest fee charged to retail investors, and estimated transaction costs (10 bps). There were no material changes to the investment model during the period presented.

The Developed Markets ex-US VMP model portfolio was inceptioned on October 15, 2015. Performance presented for January 1, 1997 through October 30, 2015 is back-tested performance. The model portfolio is fully invested and does not maintain any cash. Back-test dividends were reinvested into individual securities (i.e. initial weights are drifted forward, reinvesting dividends). Model dividends are reinvested across entire portfolio (i.e. initial shares do not change). The model return assumes no additional cash inflows or outflows. The back-test and model data reflect an annual reconstitution in October and assumes that all securities held were available for purchase and sufficiently liquid to achieve the trading activity used by the model. Transactions are executed, without exception, market-on-close; securities are priced by FactSet. Performance is calculated by aggregating security total return times security weight for each security in the portfolio each month. Performance reflects the deduction of management fees (40 bps), the highest fee charged to retail investors, and estimated transaction costs (15 bps). There were no material changes to the investment model during the period presented.

Model/target portfolio information presented, including, but not limited to, objectives, allocations, and portfolio characteristics, is intended to provide a general example of the implementation of the strategy and no representation is being made that any client account will or is likely to

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