

FINDING VALUE

Understanding Factor Investing

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EXECUTIVE SUMMARY

Despite agreement on the principles of value investing, academics and investors use widely differing metrics to capture relative value. Simply put, the investment community lacks a consistent way of describing value. Each metric (or descriptor) has differing advantages and pitfalls. For example, book value per share, representing common equity available to shareholders, is a stable measure but is backward-looking. In contrast, earnings yield can be forward-looking but is subject to accounting distortions, does not take into account financial leverage and can be subjective.

In this paper, we seek to create a common definition of value that includes multiple descriptors. We also show how improvements such as the use of forward earnings can help provide protection against “value traps” — stocks that appear to be cheap but in reality do not improve in price. We also show how whole-firm valuation measures such as enterprise value can reduce concentration in leveraged companies. While each descriptor has its own advantages and drawbacks, combining a number of these different descriptors helped achieve a more consistent risk-return profile and better captured the value factor, one of six factors identified by MSCI as offering a premium over long time periods. We will examine the other five factors in subsequent papers in this series.

We then explore how value investing can be implemented in passive portfolios using the example of three generations of value indexes:

- **Traditional value indexes.** First-generation style indexes were introduced as benchmarks in the 1980s. However, because they preserve capitalization-weighting, they may introduce unintended sector and other factor biases.
- **Fundamentally weighted or Value Weighted Indexes.** Introduced in the 2000s, these approaches decouple an asset’s weight in the index from its price. They tend to have low tracking error and high capacity, but can also have unintended sector tilts and offer a relatively low exposure to the value factor.
- **High exposure indexes.** Introduced in 2014, MSCI Enhanced Value Indexes combine multiple descriptors, addressing value traps and mirroring the parent index’s sector allocation which in turn can mitigate drawdowns. High exposure indexes provide higher tracking error and higher active drawdowns when value is out of favor.

MSCI’s Enhanced Value Index offered the highest level of exposure to the value factor, affording access to the long-term premium associated with this factor. It offers the purest approach to the factor, as well as mitigating pitfalls that affect earlier iterations of value indexes. However, investors needing very high capacity or with very tight risk budgets might look instead to the second-generation approaches such as MSCI’s Value Weighted Indexes.

INTRODUCTION

Benjamin Graham and David Dodd laid out their principles of value investing more than 80 years ago. Many investors have profited from their insight that one should buy stocks that are selling at a discount to their intrinsic value.

Despite agreement on the principles of value investing, however, academics and investors use widely differing metrics to capture different dimensions of relative value, creating confusion in the marketplace. Each of these metrics (also called descriptors) has differing advantages and pitfalls.

This paper is the first in a series exploring each of the six key factors MSCI has identified as having offered long-term risk-adjusted premia versus the market-capitalization weighted equity index: value, quality, momentum, yield, low volatility and low size (small cap).

In this paper, we try to answer the following questions:

1. What is value investing?
2. What are the characteristics of value strategies?
3. How can value strategies be implemented?

We discuss the merits of three generations of value indexes — traditional value indexes, fundamentally weighted or value weighted indexes, and high exposure value indexes. Traditional value indexes were introduced as benchmarks in the 1980s. They preserve cap-weighting, but can introduce unintended sector and other factor biases. Fundamentally weighted or value weighted indexes were introduced in the 2000s. They decouple an asset's weight in the index from its price and have low tracking error and high capacity but can also include unintended sector bets and do not offer a high exposure approach.

High exposure value indexes attempt to remedy some of the pitfalls faced by value weighted indexes. In particular, improvements such as the use of forward earnings can help provide protection against “value traps” — stocks that appear to be cheap but in reality do not improve in price. In addition, whole-firm valuation measures such as enterprise value can reduce concentration in leveraged companies. Furthermore, maintaining the sector allocation of the parent index (known as “sector neutrality”) can mitigate some of the risk of extreme events which is inherent in the focus on a single descriptor alone.

Factor indexes, of course, need to be replicable by investors. In the last section, we address the trade-offs between obtaining a broad exposure to the value premium in a high capacity approach versus obtaining high exposure value exposure.

This paper is organized into three sections. In the first section we review the existing literature and theories behind value investing. We then examine the historical behavior of common measures of value. Lastly, we chart the evolution of approaches to passive, rules-based value investing.

WHAT IS VALUE INVESTING?

At the core of value investing is the belief that “cheaply” valued assets tend to outperform “richly” valued assets over a long horizon. Value investing was popularized by Benjamin Graham and David Dodd in 1934 before much theory had been formally developed. Their investing guideposts called for a margin of safety, where the price of the firm today is less than conservative estimates of the cash flow generated from the firm’s assets.

We would argue that modern-day fundamental value managers have stuck to these early guideposts. Identifying divergences between price and replacement cost, price and future growth and price catalysts could all describe a modern value manager’s investment thesis.

Academics have extensively researched the value premium and attempted to explain its existence. Their conclusions can be broadly classified into two groups:

- The Efficient Market Hypothesis (EMH) holds that the value premium is a reward for bearing systematic (undiversifiable) risk.
- Behavioral Finance theory seeks to provide explanations for why investors sometimes make irrational decisions, thus causing mispricing of securities.

EMH advocates, such as Fama and French (1992), explain that value stocks historically have received a premium as compensation for higher real or perceived systematic sources of risk that they bear. They argue that value stocks tend to carry higher fundamental risk, such as the cost of financial distress, and therefore higher returns. In addition, Cochrane (1991, 1996) and Zhang (2005) suggest that value firms have less flexibility in adapting to unfavorable economic environments than their leaner and more flexible growth counterparts. Meanwhile, Chen and Zhang (1998) and Siegel (2000) found value stocks are riskier due to their financial leverage, operating leverage and uncertainty in future earnings.

Fama and French developed their three-factor model to account for value and size effects, in which price-to-book became one of the standard ways of measuring fundamental value. Their paper laid the foundations for value (and size) to be viewed as factors which could be systematically captured through active and passive investment vehicles.

More recently, MSCI Research demonstrated that value and small-cap portfolios are more sensitive to real GDP shocks than growth and large-cap portfolios. The long-term value

premium therefore reflects compensation for value stocks' excess exposure to uncertainty in economic trend growth (Winkelmann et al., 2014).

In contrast, behavioral finance advocates question the EMH and attribute the value premium to “systematic errors” made by investors. Value investors seek to profit from these errors. Lakonishok, Shleifer and Vishny (1994) proposed that value strategies work because they bet against behavioral fallacies, such as extrapolating past growth into the future, chasing glamor stocks and overreacting to news. The earnings multiple, for example, is driven by the forward long-term growth rate of the firm’s earnings. Errors in estimates, or earnings misses, result in large changes in valuation. Barberis and Huang (2001) supported this explanation, noting investors are more risk averse after an initial loss.

Exhibit 1: Key Academic Research on the Value Premium

	Author	Summary
Systematic Risks	Fama & French	Return of value stocks explained by higher fundamental risk. Identified value premium in international equities
	Cochrane & Zhang	Limited flexibility of value firms to adjust to economic regime
	Hansen, Heaton & Li	Value premium is compensation for GDP sensitivity
	Loughran & Wellman	Enterprise multiple as a proxy for firm’s discount rate
Systematic Errors	Lakonishok, Shleifer & Vishny	Behavior fallacies in value strategies
	Barberis & Huang	Investors have loss aversion

Fama and French (1998) extended their previous analysis to a longer time period (1963-1994) and also to international markets. Their findings supported the value premium over a long history and internationally. More recently, MSCI research showed that U.S., European, emerging market and international portfolios that tilted on value stocks outperformed their cap-weighted counterparts over the past 40 years (Alighanbari et al., 2014).

The next two sections detail how modern rules-based passive portfolios can implement a value investing strategy.

DEFINING THE VALUE FACTOR

MSCI has been developing and producing equity risk models since the early 1970s. Throughout this evolution, relative valuation has been considered both a risk factor in explaining cross-sectional differences in asset returns as well as a premium factor.

As risk models have evolved, so have the descriptors used to define factors. New descriptors must advance a sound theoretical justification for inclusion in the model, be useful in predicting risk in the presence of existing descriptors, and be able to be constructed in a timely and accurate fashion from available data. In other words, each new descriptor must add explanatory power to the model.

MSCI's early generation Global Equity Models (GEM), for example, used a composite definition for their value factor (Exhibit 2). More recent equity models separate the composite into standalone factors, while also adding new descriptors to each factor. In particular, we believe dividend income reflects an investment process distinct from value investing and is now captured in its own factor.

Exhibit 2: Evolution of the Value Factor in Equity Risk Models

GEM1	GEM2	GEM3	Next Generation Models
Value: Forward earnings-to-price, trailing earnings-to-price, Book-to-price, Dividend-to-price	Value: Forward earnings-to-price, Trailing earnings-to-price, Cash earnings-to-price, Book-to-price, Dividend-to-price	Value: Book-to-price	Value: Book-to-price, Sales-to-price, Cash flow-to-price
		Earnings Yield: Forward earnings-to-price, Trailing earnings-to-price, Cash earnings-to-price	Earnings Yield: Enterprise multiple, Forward earnings-to-price, Trailing earnings-to-price
		Dividend Yield: Dividend-to-price	Dividend Yield: Historical dividend-to-price, Forward dividend-to-price

Factor index construction mirrors factor model construction where possible. The adoption of enterprise valuation and the separation of income from valuation are two recent examples of this parallel construction.

To enable comparison across firms of different sizes, the descriptors in Exhibit 2 are usually created by normalizing a balance sheet or income statement variable against some market measure of size such as the stock price or market value of equity plus book value of net debt (enterprise value). We believe all of these descriptors have their own particular strengths and weaknesses, which we summarize in Exhibit 3.

Exhibit 3: Summary of Common Value Descriptors

Descriptor	Advantage	Disadvantage	Fundamental Driver
Book Value-to-Price	Stable, low turnover	Backward-looking, sector biases	Return on equity, level of abnormal earnings
Earnings-to-Price	Forward-looking	Subject to distortion, volatile	Growth rate of abnormal earnings
Enterprise Value to cash flow from operations	Captures all sources of capital	If EBITDA is used for cash flow, cash flow is overstated if working capital is growing	Growth rate of cash flow, profitability
Sales-to-Price	Stable	Revenue recognition distortions, does not account for cost structure	Net profit margin

Book Value per share (B/P) represents the common equity available to shareholders. Book valuations are driven by the level of abnormal earnings: A firm that generates return in excess of its cost of capital should increase its book valuation (English, 2001). Disadvantages of using B/P include that it is backward-looking, can have sector biases and that the price multiple reflects only the market value of the firm's equity.

Earnings Yield (earnings to price or E/P) can overcome the criticism of looking backward if investors use forward earnings relative to current market value. The use of forward analyst earnings estimates can help mitigate the potential for investing in "value traps" whose valuation might appear favorable based on B/P, but where earnings growth is low or even negative, causing Book Value to stagnate. Some criticisms of earnings-based measures, however, are that they can be subject to accounting distortions, can be zero or negative, do not take into account financial leverage and that earnings estimates in particular are subjective.

Given the problems generated by negative earnings, a measure which is “higher up the Income Statement” such as Sales is favored by some to construct a value descriptor. The main advantage of **Sales-to-Price (S/P)** is that sales cannot be negative. However, revenue recognition practices can distort sales, and solely using S/P does not account for unprofitable firms or differences in operating leverage and cost structure between firms.

One way of addressing the fact that firms with similar levels of earnings but different levels of financial leverage can have very different returns on equity is to look at equity and debt together. **Enterprise Value (EV)** takes a “whole firm” perspective by including the market value of net debt and preferred shares along with common equity. Enterprise value is normally divided into some measure of income or cash flow available at the firm level to create an enterprise multiple. Common measures of cash flow include Cash Flow from Operations (CFO), Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA), and Free Cash Flow (FCF).

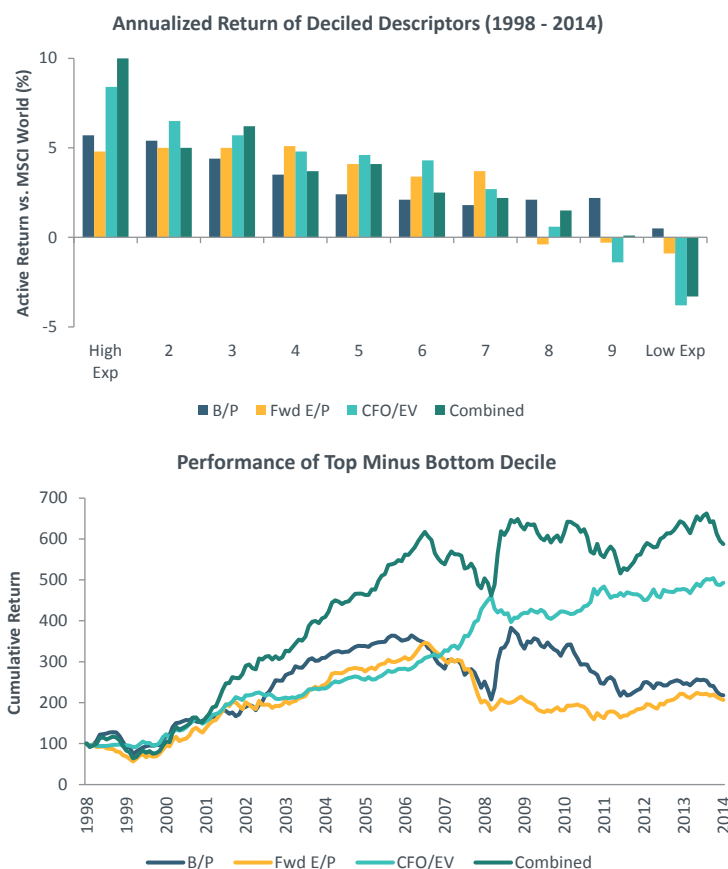
In the academic literature, enterprise multiples can be interpreted as a proxy for the discount rate (Loughran, 2012). Firms with high multiples have high expected cash flows relative to operating income, implying high growth opportunities and a relatively lower discount rate than firms with low multiples. Importantly, the enterprise multiple facilitates valuing companies with different capital structures, as enterprise value accounts for debt and cash flow is a pre-interest measure.

DISSECTING AND COMBINING DESCRIPTORS

While each value descriptor has its own advantages and drawbacks, it is important to understand how descriptor performance manifests itself through a universe of stocks. For example, does more of the performance come from holding the “high value” names or avoiding the “low value” names, or is the effect spread throughout the population? In a decile analysis, we split our universe of stocks into 10 groups by number and ranked by their exposure to each descriptor, to help understand how differences in risk and return between low and high value stocks appear within descriptors.

The top plot in Exhibit 4 shows the return to decile portfolios that increase exposure to three relative value measures: CFO/EV, B/P and forward E/P. On average, the descriptor deciles behave as expected: Higher value stocks have tended to outperform lower value stocks, as measured by any individual descriptor, over the 16-years ended December 2014. The cumulative return of the top minus the bottom deciles isolates the effect of each descriptor, and is an approximation of a pure factor return.

Exhibit 4: Combining Value Descriptors Improved Strategy Outcomes



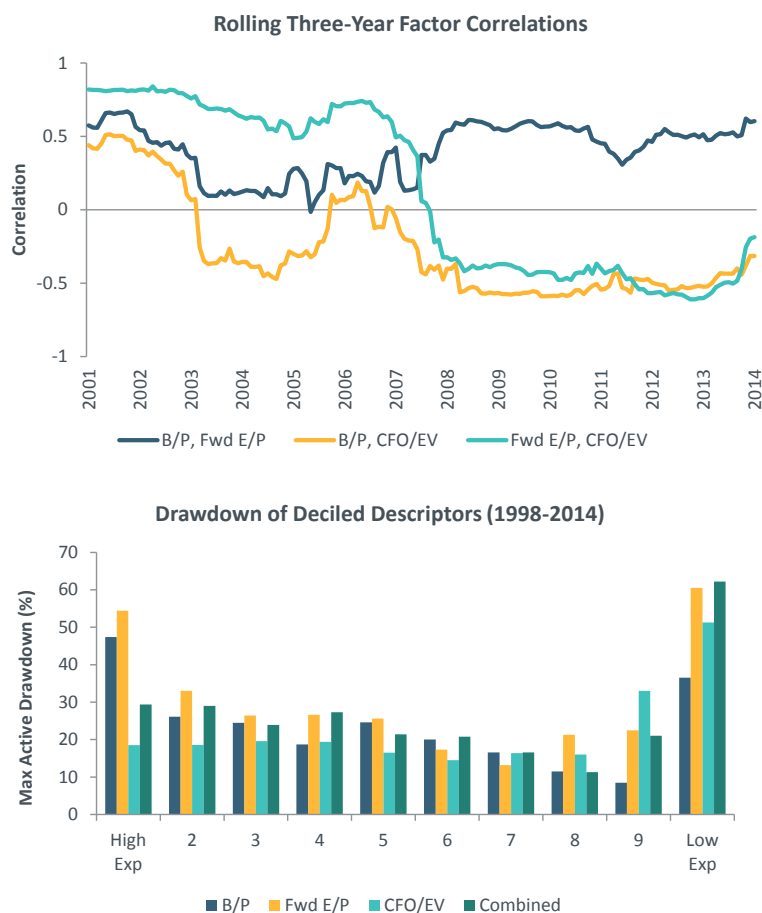
Note: December 1998 – December 2014. Deciles are equally weighted.

The motivation for combining value descriptors in an investment process is shown in the bottom plot of Exhibit 4: Individual descriptors display cyclicalities, but as the standalone descriptors have low correlation with each other (top plot, Exhibit 5), the performance of the combined descriptors has been superior to any standalone descriptor. The combination of Book-to-Price and Forward Earnings-to-Price in particular has the potential to protect against value traps without relying solely on analyst earnings estimates. Descriptor combinations also reduced drawdowns in high exposure deciles over standalone equity-only measures such as B/P and forward E/P (bottom plot, Exhibit 5) and improved the risk-adjusted return of the combined portfolio.

Overall, we believe that combining descriptors provides a better definition of value. The effectiveness of the combined approach stems from the different slices they take of a firm's

fundamental data. Earnings Yield is an income statement measure, whereas an asset-based measure such as Book-to-Price has more relevance for sectors that trade on assets. A whole-firm descriptor such as CFO/EV adds another dimension to these equity-only measures.

Exhibit 5: Standalone Value Descriptors Diversify One Another



Note: December 1998 – December 2014. Correlations use equally weighted rolling monthly returns over prior 36 months. Deciles are equally weighted.

WHAT DO ACTIVE VALUE MANAGERS DO?

Looking back at Graham's notion of value investing, we would see it as a multi-factor combination of stable dividend yield, low leverage, high quality earnings and high earnings yield. Similarly, some modern value investors tend to invest not only in the value factor alone, but also in facets of other equity styles such as income or quality.

For others, value investing represents a distressed investing strategy in which an investor identifies a divergence between market price and fundamental value that they expect will correct. For them, this "deep value" approach is distinct from quality investing, where an investor identifies an economic moat such as pricing power or cost structure that protects a firm's return on equity. High-quality companies are often richly priced — the opposite of distressed investments.¹ High dividend-paying companies indicate management's preference for capital return — distinct from a traditional value approach.

We can gain insight into how active managers currently practice value investing by examining how they have constructed their portfolios. In Exhibit 6 we compare the intended (or unintended) differences between five common U.S. mutual fund investment styles (value, growth, dividend, income and quality) using factor exposure data from MSCI's Peer Analytics database.² A key word search on Lipper mutual fund names is used to determine fund style (column names) and actual fund holdings are used to determine factor exposures (row names) based on the MSCI US Total Market Model.³

Not surprisingly, the 412 managers classified as "value" in the total sample have high average exposures to value-related factors, scoring 81st, 71st and 61st percentiles for the Book-to-Price, Earnings Yield and Dividend Yield factors, respectively.

However, value managers also tend to hold stocks of companies that have:

- 1) missed earnings expectations (lower Profitability)
- 2) displayed uncertainty surrounding their earnings (lower Earnings Quality)

¹ The MSCI ACWI Quality index (a portfolio of global, high-quality stocks) had an average price-to-book (P/B) multiple of 4.2x from December 1998 to January 2015. The cap-weighted MSCI ACWI Index had an average P/B of 2.2x over the same period. The appendix illustrates combinations of standalone value and quality strategies.

² MSCI Peer Analytics contains mutual fund classifications and holdings and is available in MSCI analytics products. The 1007 funds shown in Exhibit 1 represent five investment styles, and approximately 50% of the total fund universe.

³ The MSCI US Total Market Model (USTMM) is a risk model that explains risk and return for US equity portfolios. Its 20 style factors represent fundamental and price attributes. Profitability is a composite of gross profitability, net margin, return on equity, return on assets and asset turnover. Earnings Quality is a composite of accruals and estimate dispersion. Management Quality is a composite of asset growth, capex growth and net share issuance growth. Momentum is one-year price momentum.

- 3) avoided capital investment or recently shed assets (higher Management Quality)
- 4) taken on debt (higher Leverage) and
- 5) experienced recent drops in their prices (lower Momentum).

These quantitative attributes confirm the qualitative description of value managers as contrarian investors in equities that trade at a discount to their intrinsic worth.

Exhibit 6: Exposure Percentile Ranking of Selected US Mutual Fund Styles

	Manager Style				
	Value	Growth	Dividend	Income	Quality
Book to Price	81	22	58	58	30
Earnings Yield	71	27	75	74	65
Dividend Yield	61	29	90	89	77
Long term Reversal	57	30	66	70	62
Leverage	72	28	66	72	34
Growth	23	77	18	19	38
Profitability	22	75	37	39	71
Earnings Quality	36	59	63	63	89
Management Quality	69	30	74	71	66
Momentum	36	65	43	48	34
Regional Momentum	32	56	53	55	59
Size	40	46	67	72	68
Midcap	55	56	37	33	37
Beta	55	56	19	20	13
Residual Volatility	26	67	32	34	43
Sentiment	34	71	23	22	53
Liquidity	42	57	35	37	33
Short Interest	50	45	70	68	74
Downside Risk	64	48	38	35	43
Prospect	49	60	50	44	53
# of Funds	412	438	67	82	8

Source: Lipper, MSCI

IMPLEMENTING VALUE STRATEGIES IN A PORTFOLIO

Style indexes that include value were first introduced in the 1980s as benchmarks for value and growth managers, and continue to be widely used today. Their construction is straightforward as they first use valuation (or growth) attributes to select assets from a parent benchmark and then weight by capitalization within the subset. They are mutually exclusive in that the value style index holds at any time half the assets in the parent benchmark (and the growth style index holds the other half).

Because style indexes preserve cap-weighting, unintended sector and other factor biases may be introduced. A value style index can introduce significant tilts to structurally cyclical industries such as financials, and a size bias towards large caps.

Indexes that decoupled an asset's weight in the index from its price (generically known as "fundamentally weighted indexes") were introduced in the 2000s. Fundamental attributes

such as sales, earnings and book value are combined to reweight assets. Because they hold all assets in the starting universe, these fundamentally weighted, or value-weighted, indexes generally have low tracking error and high capacity. They have gained acceptance not only as style benchmarks, but also as the basis for investment vehicles to capture the value premium.

Fundamentally weighted indexes also have their limitations — primarily that unintended sector tilts are introduced in construction. Importantly, the portfolio construction does not address investors in need of a higher exposure, higher tracking error vehicle that more closely matches the high exposure value investment style of active value managers.

Exhibit 7: Summary of MSCI's Global Value Index Construction Methods

	Value Style	Value Weighting	Enhanced Value
Active Exposure to Value ⁴	0.39	0.27	0.72
Tracking Error/Active Share	Low	Low	High
Concentration	Moderate	Low	High
Descriptors	Forward Earnings, Book Value, Dividends	Sales, Book Value, Earnings, Cash Earnings	Forward Earnings, Book Value, Cash Flow, Enterprise Value
Historical Sector Tilts	Overweight financials	Overweight financials	Sector constrained
Historical Country Tilts	Low	Moderate	Underweight US

The family of Enhanced Value Indexes launched by MSCI in 2014 provides this high exposure to value, albeit with higher tracking error. Active exposure to value was 0.72, based on the average GEM2 Value factor exposure from December 1998 to December 2014, compared to 0.39 for the value style and 0.27 for value weighting (Exhibit 7). First-generation value and second-generation value weighted indexes have similar levels of tracking error, averaging 2% against the cap-weighted parent MSCI World Index. Please see Appendix 2 for more information on tracking error, control of sector biases and economic regime behavior.

⁴ A positive active exposure to the factor indicates the portfolio is relatively cheaper than the parent MSCI World Index. The value exposure is the average from December 1998 to December 2014.

The Enhanced Value Indexes combine multiple descriptors, including enterprise multiples. Value traps are addressed by incorporating forward earnings-to-price, sector neutrality is addressed explicitly and there is special treatment of financials given their different capital structure. These indexes are designed for investors comfortable with higher tracking error and higher active drawdowns during periods when the value cycle is unfavorable.

LIQUIDITY AND CAPACITY CONSTRAINTS

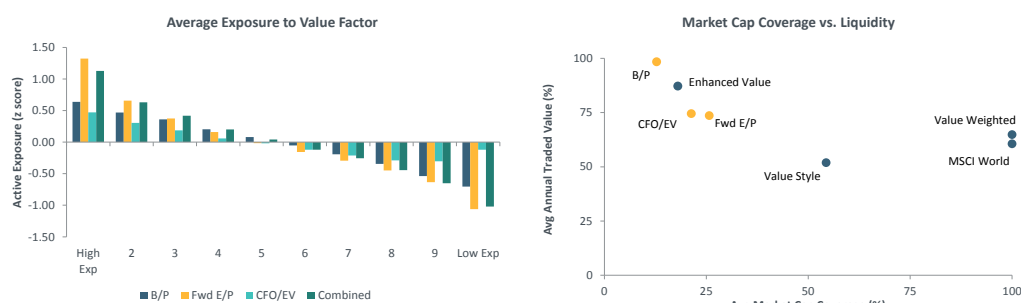
Indexes need to be investable. As noted previously, the first- and second-generation value indexes enjoy substantial liquidity and capacity. For the high exposure factor indexes, we must balance exposure to the factor with investors' ability to replicate the index.

The top deciles of each standalone descriptor, in addition to the combination, should have sufficient market coverage of the parent benchmark. This ensures that the strategy's "signal" is not concentrated in a narrow niche of the market.

The left plot in Exhibit 8 shows the active exposure to the MSCI GEM2 Value factor for the standalone descriptors and their combination. Exposure scales with decile, as expected. We can also see that combining descriptors does not dilute the exposure to value.

The right plot shows the fraction of the MSCI World's market capitalization that is covered by constructing investable indexes based on standalone descriptors and their combination. The annual traded volume of the stocks in each index is also shown.

Exhibit 8: Exposure and Capacity of Enhanced Value Strategy



Note: Average exposures and market cap coverage are from December 1998 – December 2014. The Annual Traded Value Ratio (ATVR) measures trading volume in a security as a proportion of market capitalization. The weighted average ATVR measures this liquidity at the index level.

The high exposure indexes in the upper left quadrant cover a smaller fraction of the parent than the lower exposure, higher capacity value and value weighted indexes. The underlying stock liquidity in high exposure indexes is marginally higher than the lower exposure

indexes. A summary of capacity and liquidity considerations for the three value strategies is shown in Exhibit 9.

Exhibit 9: Capacity Considerations in Different Value Strategies

Capacity, Concentration, Liquidity Metrics & Cost of Replication				
	MSCI World Index	MSCI World Enhanced Value Index	MSCI World Value Weighted Index	MSCI World Value Index
Concentration Metrics ¹				
Avg No of Stocks	1629	400	1629	918
Effective No of Stocks	314	119	338	158
Market Cap Coverage (%)	100.0	18.2	100.0	54.4
Top 10 Sec Wt (%)	11.5	19.9	10.5	18.1
Capacity of the Index ²				
Stock Ownership (% of Float Market Cap)				
Average	0.00	0.02	0.00	0.01
Tail Average @95%	0.00	0.05	0.01	0.01
Maximum	0.00	0.06	0.04	0.01
Degree of Index Tilt ¹				
Active Share (%)	0.0	77.7	23.8	45.9
Max Strategy Weight (%)	2.0	3.2	1.6	3.3
Liquidity Metrics				
Weighted Average ATVR (%)	58.5	82.2	64.8	51.9
Days to Trade - Periodic Index Review ³				
Weighted Average	0.0	0.1	0.0	0.0
Tail Average @ 95%	0.0	0.5	0.1	0.3
Days to complete 95% trading	1.0	1.0	1.0	1.0
Maximum	0.6	4.5	1.6	1.0
Cost of Replication				
Turnover (%) ⁴	3.1	38.4	17.7	20.5
Performance Drag in bps (at 75 bps) ⁵	4.7	57.6	26.5	30.7

¹ Average over all the corresponding rebalancing dates from 06/01/1999 to 11/26/2014

² Assuming a fund size of USD 1 bn as of the index review on 11/26/2014

³ Average of last four index reviews ending 03/31/2015. Assuming a fund size of USD 1 bn and a maximum daily trading limit of 10%

⁴ Annualized one-way index turnover for the 12/31/1998 to 03/31/2015 period

⁵ Performance drag aims to represent the total two-way annualized index level transaction cost assuming various levels of security level transaction cost

CONCLUSION

A key insight from Graham and Dodd's 1934 *Security Analysis* is that investors should measure the attractiveness of an investment in terms of the divergence between market price and intrinsic value. In the following 80 years, value investing has been widely investigated by academics and implemented by practitioners.

While most investors agree on its central premise, the implementation of value strategies has differed widely. In this paper, we investigated several of the more common descriptors of firm value, showed how each captured a different dimension of relative value and highlighted the advantages and pitfalls of each.

Next, we sought to create a common definition of value. Looking over an extended history and across geographies, as well as into individual value deciles, we showed how combining a number of these different descriptors captured the value factor better than using any individual descriptor alone.

Looking at factor exposures of active value managers, we found that they have high average exposures to several value-related factors and tend to invest in securities that sell at a discount to their intrinsic worth. In contrast, first- and second-generation value index approaches tended to have lower average exposures to value than active managers' high exposure value approach.

However, a high exposure value approach can face certain pitfalls. Our analysis showed how improvements such as the use of forward earnings could help provide protection against value traps, and whole-firm valuation measures such as enterprise value could reduce concentration in leveraged companies. Sector neutrality mitigated some of the drawdown inherent with the value investing style.

Third-generation Enhanced Value Indexes combine these improvements into a single systematic value investment strategy. However, one key consideration in factor index construction is balancing factor exposure with investability; high capacity and high exposure indexes each offer different tradeoffs. Risk-budget constrained investors might prefer earlier generation high capacity value strategies to provide broad exposure to the value premium with minimal tracking error. On the other hand, investors seeking high exposure value exposure and willing to take more benchmark risk could consider an Enhanced Value strategy.

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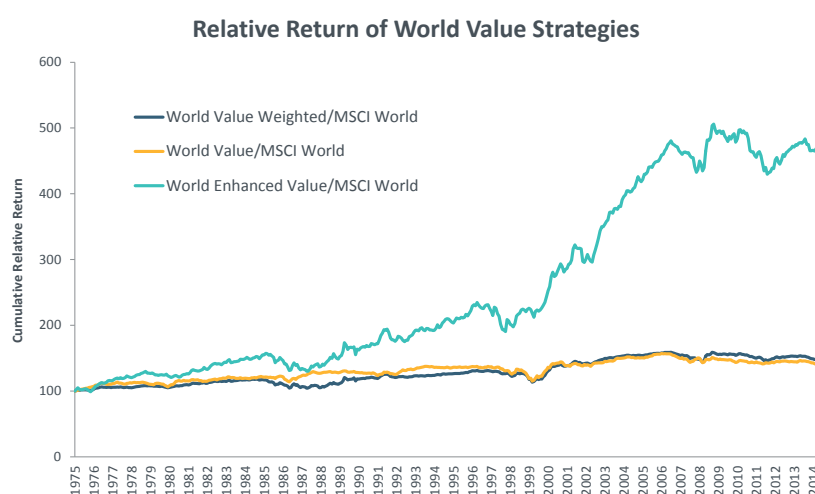
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APPENDIX 1: REGIONAL BEHAVIOR

Comparing recent performance of the three generations of value provides interesting contrasts. Globally, the first- and second-generation indexes (offering low tracking error and high capacity by design) provide similar performance relative to the MSCI World cap-weighted parent (Exhibit A1). The high exposure, enhanced value strategy has historically captured more of the value factor.

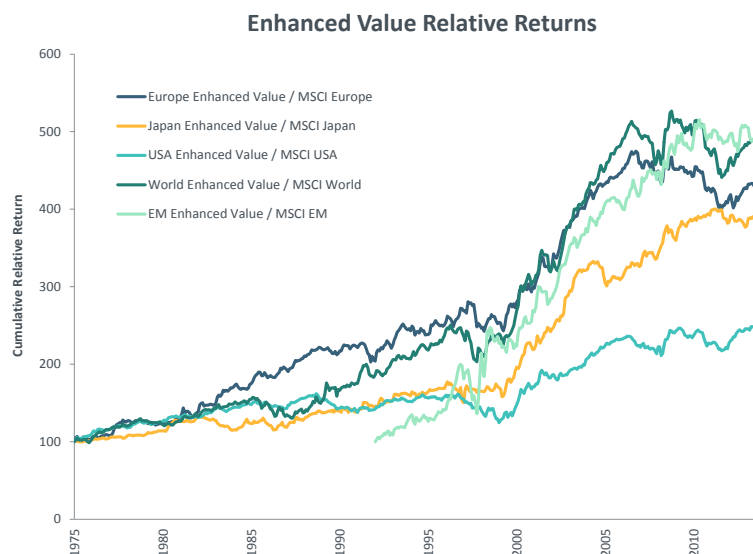
Exhibit A1: Performance of Global Value Strategy Construction Methods



Within individual regions, we see the costs of a high exposure value strategy are extended periods of underperformance (e.g., 1988 to 2000 in the U.S.), and periods of sharp active drawdown (e.g., 1997 for World). The performance of the regional enhanced strategies is shown in Exhibit A2, extended back to 1976.⁵ Full period risk-adjusted returns relative to each region's cap-weighted parent are shown in the bottom table in Exhibit A2. For comparison, relative returns for the value style and value weighted strategies for each region are shown in Exhibit A3.

⁵ We use the MSCI Enhanced Value index methodology to simulate historical holdings. Assets receive a z-score for each standalone descriptor. A composite z-score is the weighted average of each individual score. Each score is then standardized within an asset's sector. The parent index is ranked by composite score, and a fixed number of securities determine the number of constituents. Prior to 1997, we use cash earnings to price in place of CFO/EV. Financials receive only two scores, based on B/P and forward E/P. Trailing E/P is used where no forward estimate exists. Sectors are defined by the top-level layer of GICS®, the global industry classification standard jointly developed by MSCI and Standard & Poor's, which assigns companies to one of ten economic sectors. Before 1994, these definitions are extended by mapping the Barra model industry classification to the GICS sectors.

Exhibit A2: Relative Performance of Regional Enhanced Value Strategies



Key Metrics

	Europe Enhanced Value / MSCI Europe	Japan Enhanced Value / MSCI Japan	USA Enhanced Value / MSCI USA	EM Enhanced Value / MSCI EM	World Enhanced Value / MSCI World
Total Return* (%)	15.2	11.8	14.0	15.6	15.0
Total Risk* (%)	18.8	22.3	16.1	29.0	16.2
Return/Risk	0.81	0.53	0.87	0.54	0.93
Active Return* (%)	4.3	3.8	2.7	8.0	4.5
Tracking Error* (%)	5.8	5.9	5.0	12.2	6.5
Information Ratio	0.74	0.65	0.54	0.66	0.69
Historical Beta	1.03	1.02	1.02	1.14	1.01
Turnover** (%)	39.2	36.2	31.5	40.8	39.2
Price to Book***	0.8	1.3	1.3	0.8	1.0
Price to Earnings***	8.6	28.7	11.0	11.6	10.1
Div. Yield*** (%)	4.6	1.6	3.5	3.2	4.1
Max Drawdown (%)	66.0	51.9	59.5	67.7	61.7
Max Drawdown of Active Returns (%)	16.7	17.8	24.1	36.1	20.1

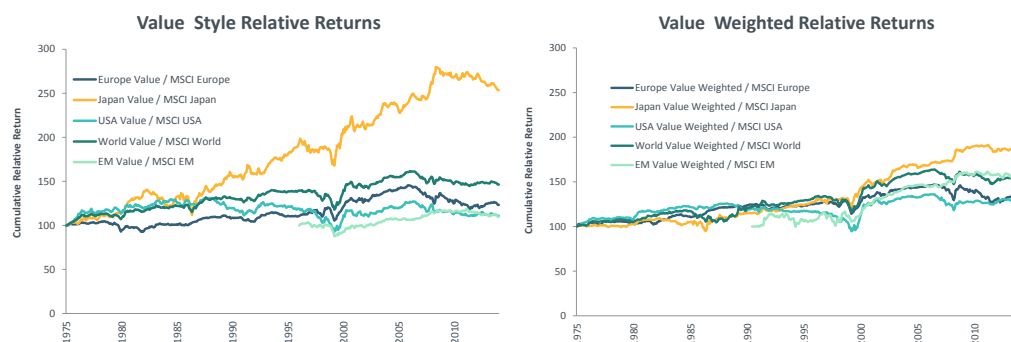
* Gross returns annualized in USD for the 12/31/1975 to 12/31/2014 period

** Annualized one-way index turnover for the 12/31/1975 to 12/31/2014 period

*** Monthly averages for the 12/31/1975 to 12/31/2014 period

EM returns are for the 12/31/1992 to 12/31/2014 period

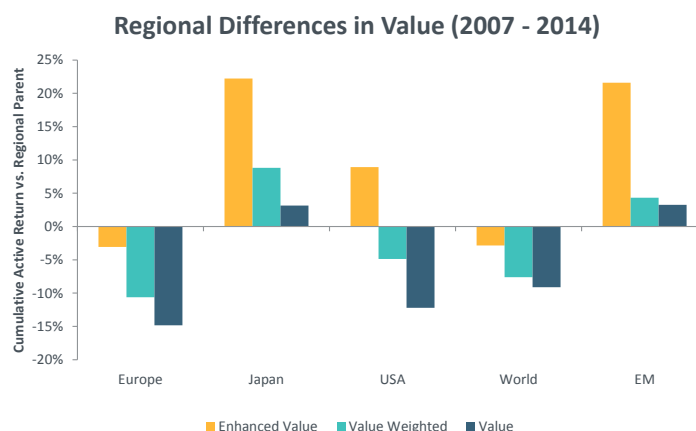
Exhibit A3: Performance of Regional Value Strategy Construction Methods



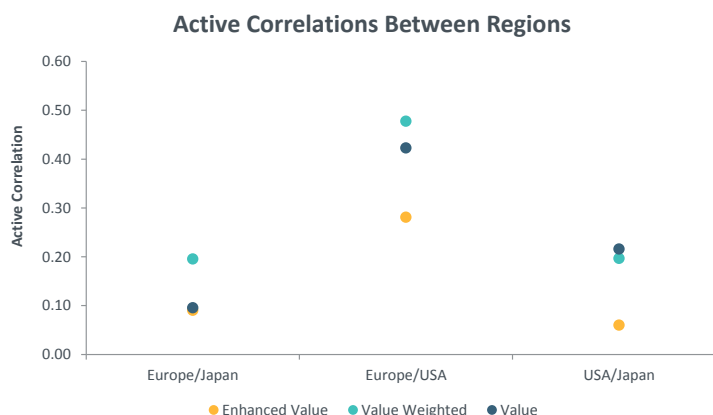
First- and second-generation value indexes have underperformed the market, beginning in January 2007 in Europe and the U.S., as can be seen in Exhibit A3. However, Enhanced Value Indexes outperformed their early generation counterparts in all regions. In the U.S., the Enhanced Value Index resulted in outperformance over the last eight years. The sector neutrality of Enhanced Value Indexes mitigates some of the financial sector tilts, and exposure to leveraged companies, that dragged on the performance of early generation value indexes.

Exhibits A2 and A4 also demonstrate regional differences in the value cycle. Value is not rewarded from 1988 to 2000 in the U.S. (Exhibit A2), but is globally. Correlations between regional value strategies are shown in the bottom plot in Exhibit A4. In each case the Enhanced Value Index pairs show lower correlations than their first- and second-generation counterparts.

Exhibit A4: Regional Behavior of Value Indexes from Jan 2007 to March 2015



Note: Returns are from January 2007 to December 2014



Note: Correlations use returns from December 1975 – December 2014

European and U.S. value – regardless of implementation strategy – are more synchronized than both European and Japanese value, and U.S. and Japanese value. There is also academic support for value diversification across regions. Chue et al. (2015) indicate the “crash risks” of value investing can be lowered with international diversification.

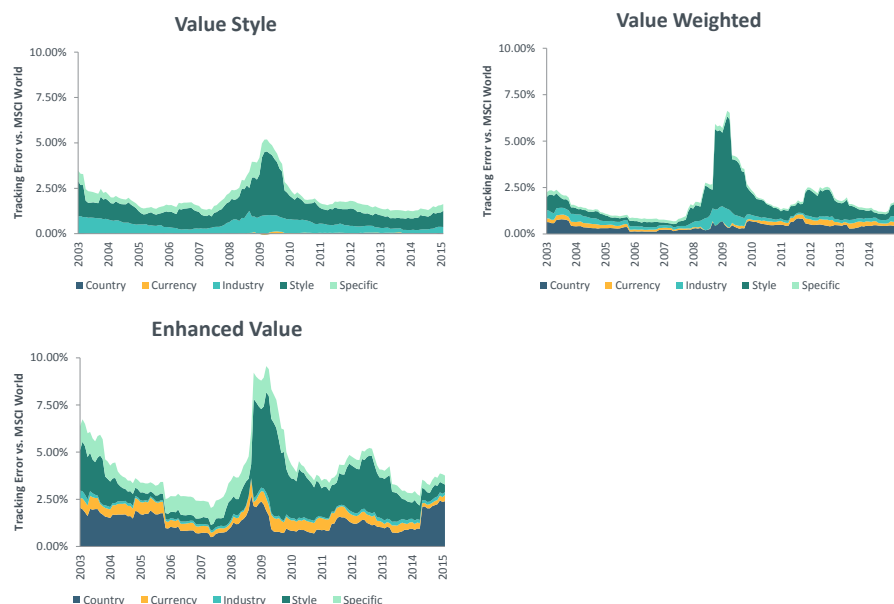
APPENDIX 2: TRACKING ERROR, SECTOR BIASES AND ECONOMIC REGIMES

TRACKING ERROR

Comparing the tracking error of the three generations of value indexes provides additional insights. First-generation value and second-generation Value Weighted Indexes have similar levels of tracking error, averaging 2% against the cap-weighted parent MSCI World Index (Exhibit A5). All the value indexes show a peak in tracking error at the time of the financial crisis, corresponding with a selloff in value stocks and a peak in the value factor's standalone volatility.

The first-generation value index has large contributions to tracking error from styles as expected, but also large and consistent contributions from industry tilts, as previously noted. The Value Weighted Index removes some of the industry contribution to tracking error, effectively focusing tracking error on styles. Value Weighted Indexes reweight but hold all of the stocks in the parent universe – firm-specific events (specific tracking error) that could affect the portfolio are therefore minimized.

Exhibit A5: Tracking Error Decomposition of Different Value Strategies



Source: MSCI

The Enhanced Value Index results in a higher average tracking error, with a larger relative contribution from styles. Maintaining sector weights that correspond to the parent index (sector neutrality) results in minimal industry contributions to tracking error, but comes at the expense of larger country contributions. Also, an Enhanced Value portfolio holds more concentrated positions in fewer stocks, resulting in the introduction of firm-specific effects on tracking error.

CONTROLLING FOR SECTOR BIASES

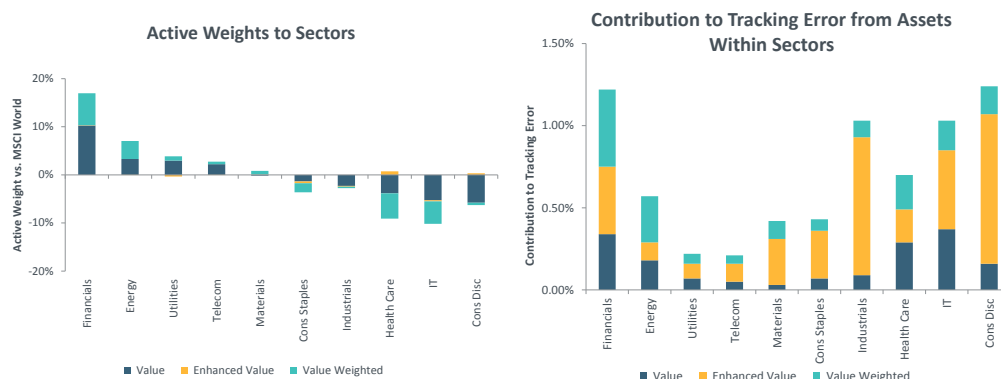
Creating sector neutral value indexes has historically offered protection for systematic value strategies. Note that sector neutrality implies that active weights are minimized on sectors in aggregate; however it does not imply that active bets are not taken *within* a sector.

The left plot of Exhibit A6 shows the active weights of each value index against the market capitalization weighted parent index. In each case, the parent is the MSCI World developed market universe. The traditional value style and Value Weighted strategies have large, and similar, tilts on sectors. Both overweight financial and underweight consumer discretionary companies. The Enhanced Value strategy by design remains sector neutral as measured by active weight.

The right plot of Exhibit A6 illustrates the distinction between active weight and tracking error: financials and health care contribute to the tracking error of all three strategies. The Enhanced Value Index also derives tracking error from consumer discretionary, industrials and technology.

The Enhanced Value Index minimizes industry effects on tracking error, maintains sector neutrality, and yet derives tracking error *within* sectors. It accomplishes this competing set of requirements by taking large relative positions on companies within each sector.

Exhibit A6: Sector Active Weights and Tracking Error for Different Value Strategies

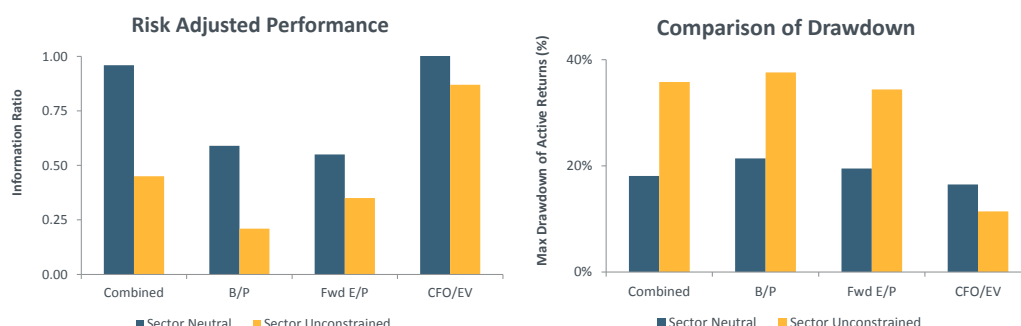


Source: MSCI

A final illustration of the ability of sectors to distort systematic value strategies is shown in Exhibit A7. Indexes are constructed from both standalone descriptors and the combined composite. The indexes are then constructed as sector neutral and sector unconstrained. The historical performance reveals that sector neutrality increases the information ratio in

all indexes, while also providing drawdown protection as evidenced by lower benchmark relative drawdowns.

Exhibit A7: Sector Neutral vs. Sector Unconstrained Value Descriptors



Note: December 1998 – December 2014

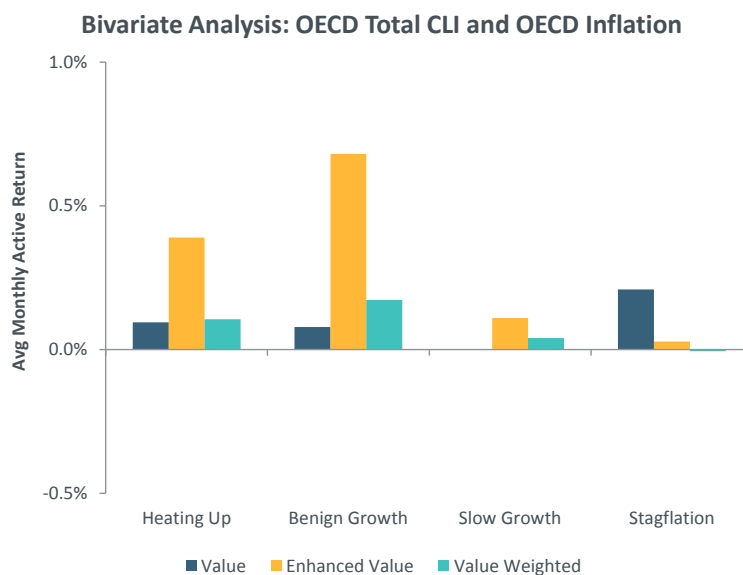
ECONOMIC REGIME BEHAVIOR

Previous MSCI research investigated the empirical behavior of equity factors in changing economic environments. In summary, the Value Weighted Index was shown to be linked with global interest rates (Owyong, 2013), and also to have pro-cyclical behavior (Gupta et al., 2014). The behavior is consistent with the premium as a compensation for macroeconomic risk. At the firm level, Zhang (2005) noted that value stocks are saddled with unproductive capital during economic slowdowns.

Exhibit A8 extends the bivariate regime analysis introduced in prior MSCI research⁶ to compare the regime behavior of the value, Value Weighted, and Enhanced Value indexes. The pattern of outperformance demonstrates that the value strategies perform well in periods of expanding growth and falling inflation (“Benign Growth” periods), and strong growth and rising inflation (“Heating Up” periods). The Enhanced Value strategy in particular is more sensitive than the other strategies to expansionary periods.

⁶OECD CLI and CPI data are used jointly to characterize four regimes as increasing growth and increasing inflation (Heating Up), increasing growth and decreasing inflation (Benign Growth), decreasing growth and increasing inflation (Stagflation), and decreasing growth and decreasing inflation (Slow Growth). The active returns against the MSCI World are then compared to determine each strategy’s sensitivity to a regime.

Exhibit A8: Behavior of Value Strategies through Economic Regimes



Note: December 1975 to December 2014. CLI and CPI levels sourced from OECD.

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