

# Porter, White & Company

## Creating Equity Portfolios

White Paper, September 2010, Number IM 28.1

### I. Purpose

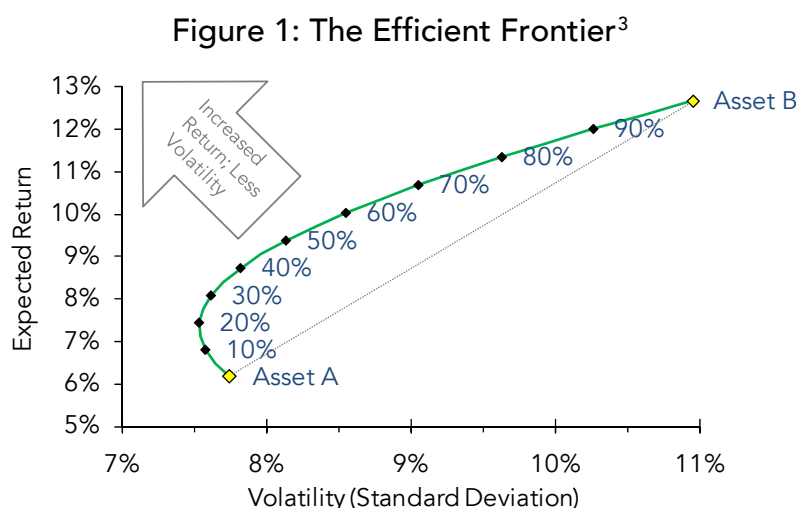
In our white paper *Selecting Asset Classes for Portfolios*,<sup>1</sup> we answered the questions, “What defines an asset class, and what makes certain assets and asset classes appropriate for our model portfolios?” This paper will explore the question: “Why do we recommend certain equity funds and equity allocations?”

*The discussion herein should be understood in light of the Important Notice at the end.*

### II. Modern Portfolio Theory

Modern portfolio theory (MPT), which tries to explain the risk and return of a portfolio composed of different investment assets, is broadly if not universally accepted by financial economists. MPT also forms the basis of the “prudent investor” standard by which professional investors are measured.<sup>2</sup> The practical aim of MPT is the selection of a collection of investment assets that, through diversification, has collectively lower risk than any individual asset. That this is possible can be seen intuitively because different types of assets and asset classes often change in value in different ways. Combinations of different assets can permit the formation of portfolios with reduced risk without reduced return, or higher expected returns without increased risk.

The figure below demonstrates the theory by displaying the expected risk-return profiles of different portfolio combinations between hypothetical assets “A” and “B.” Percentages displayed in blue indicate the share of the combined portfolio allocated to “B.”



Even though the returns of “A” and “B” are positively (though not perfectly) correlated, diversification benefits are significant. For example, the lowest-risk portfolio between them is not a 100% allocation to “A,” the less-risky asset, but includes a 20% allocation to “B” and an 80% allocation to “A.” This “minimum-variance” portfolio also yields a higher expected return than asset “A” alone. Such is the power of prudent diversification.

Figure 1 demonstrates why it is not prudent to select assets in an investment portfolio individually, each on its own merits. It is important to consider how each asset changes in price relative to the other assets in the portfolio. While we do not believe it possible to find the perfectly “optimal” portfolio because we cannot predict future returns and correlations, we do rely on relevant research and the underlying concepts of MPT to structure portfolios in ways that increase our expected risk-adjusted return and that suit our desired exposure to important risk factors.

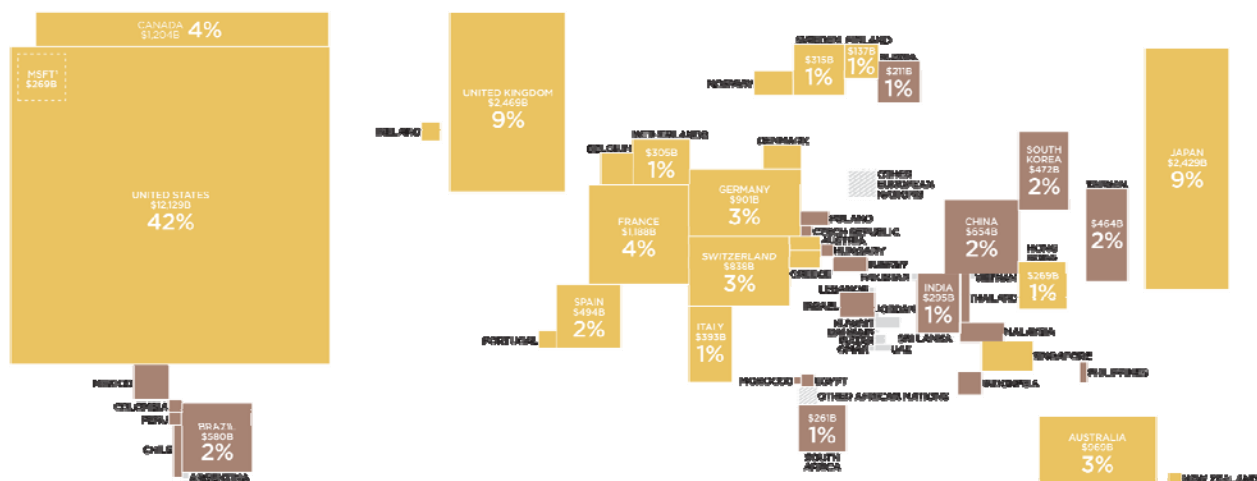
### III. Establishing Broad Allocations

When establishing equity asset allocation policies, we consider three different factors in forming portfolios: exposure to world markets, holdings of small versus large stocks, and tilts to value and growth stocks.

#### A. Broad Domestic vs. International Allocation

The starting point for the equity allocation is the global stock markets. The asset allocation policy first considers allocation to global markets (U.S., International and Emerging Markets) and then allocations within those markets.

Figure 2: World Market Capitalization as of December 2009



As shown in Table 1 below, the global markets include the stock of almost 9,000 different companies, slightly less than 3,000 of which are traded on US exchanges. This level of holdings sets the standard for a fully diversified portfolio.

Table 1: Global Market Breakdown

Sector	Total Value (\$mm)		Wtd Avg Market Cap	GDP (2009 Est.)		BtM	Securities
United States	11,572,864	44.2%	61,022	14,256,275	26.9%	0.59	2,994
Developed	11,185,078	42.7%	38,264	24,160,636	45.5%	0.71	3,631
Emerging	3,424,109	13.1%	36,242	14,643,459	27.6%	0.59	2,645
Global	26,182,051	100.0%	48,059	53,060,370	100.0%	0.64	9,270

As of July 2010. The Russell 3000 Index is used as the proxy for the US market. The proxies for the non-US developed and emerging markets are the respective developed country and emerging country portions from the MSCI All Country World IMI ex USA Index. Nominal GDP figures in U.S. dollars (\$mm) are from the International Monetary Fund's "World Economic Outlook Database, April 2010."

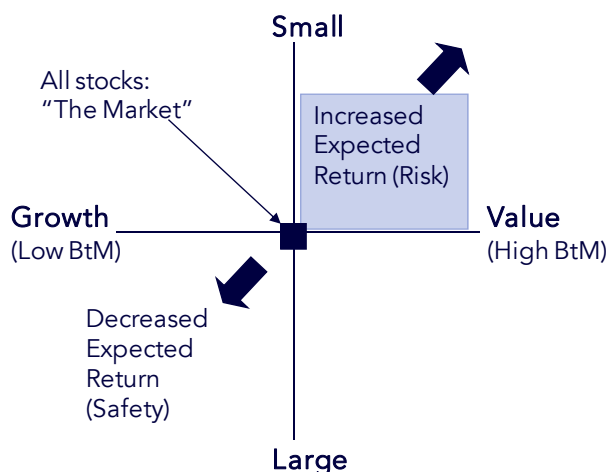
Because most investors exhibit some level of home country bias, we typically recommend portfolios that are tilted towards the U.S. market for our U.S. clients. Research has also shown that, while more than half of world market capitalization resides outside the United States, international allocations exceeding 40% benefit a U.S. investor's portfolio incrementally less, particularly as costs are accounted for.<sup>4</sup>

## B. Size and Value Risk Factors

To analyze the historical performance of an account or a mutual fund, we rely on the academic literature and the "Three Factor" model developed by Professors Eugene Fama and Ken French, which explains the average returns on stocks.<sup>5</sup> The Fama/French three-factor model says that the expected return in excess of a risk-free rate of a broadly diversified stock portfolio is a function of that portfolio's sensitivity to three risk factors:

Figure 3: Three Factor Model Performance Attributes

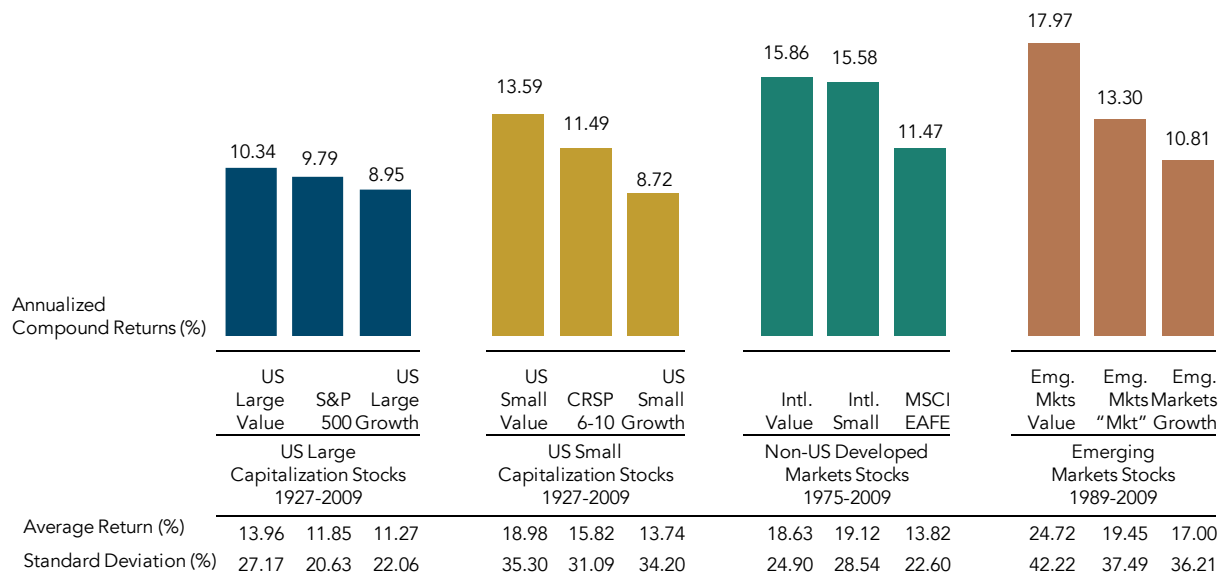
- 1) *Market*: the level of exposure to the equity markets as a whole;
- 2) *Size*: the level of investment in smaller companies as opposed to larger ones; and
- 3) *Value*: the level of investment in companies with lower price-to-book value of equity as compared to companies with higher price-to-book value of equity or higher P/E ratios.



The three factors in the Fama/French model explains much of the common variation in average stock returns in the U.S., in non-U.S. international developed and emerging markets.<sup>6</sup> The significance of these risk factors allow us to define the size and value asset classes as being distinct from equity market exposure alone.

The Fama/French model is used to divide equities into separate asset classes based on their size and value characteristics (e.g. “small value,” “large growth,” etc.).<sup>7</sup> There is also a very notable tendency of small and value stocks to outperform large and growth stocks over long periods of time:

Figure 4: Annual Index Data (1927-2009)<sup>8</sup>



Why do these effects persist? Fama and French concluded that the reason small cap and value stocks have historically had higher average returns than large cap and growth stocks is that they are riskier. The idea also makes intuitive sense: small companies are relatively undiversified and have reduced ability to absorb negative financial events; and value companies’ high ratio of book-to-market equity is often an indication of hard times or doubt regarding future earnings. The presence of size and value effects in international and emerging market stock returns provides additional evidence that the higher expected returns of small and value stocks are compensation for bearing non-diversifiable risk related to size and book-to-market equity. The increased risk is evidenced by a higher standard deviation of returns historically.

By nature of their size, the large cap sector makes up ~70% of the total value in U.S. and international developed markets with a limited number of securities. The small and mid-cap sectors have correspondingly more number of securities, thus requiring significantly more holdings to reach good exposure to this part of the market. The average pricing multiple (book-to-market) tends to be higher and more tilted towards value in the Mid Cap and, even more so, in the Small Cap sectors.

**Table 2: Markets Breakdown by Market Capitalization**

Sector	Total Value (\$mm)		Wtd Avg Market Cap	BtM	Securities
<b>United States</b>					
Large Cap	8,153,409	70.5%	85,029	0.56	259
Mid Cap	2,355,029	20.4%	5,039	0.61	632
Small Cap	1,064,426	9.2%	994	0.71	2,103
<b>Non-US Developed Markets</b>					
Large Cap	7,603,258	68.0%	54,447	0.67	360
Mid Cap	2,455,079	22.0%	5,239	0.73	812
Small Cap	1,126,741	10.0%	1,026	0.91	2,459
<b>Emerging Markets</b>					
Large Cap	1,985,183	58.0%	59,899	0.52	203
Mid Cap	917,162	26.8%	5,150	0.58	447
Small Cap	521,764	15.2%	885	0.87	1,995

As of July 2010. The Russell 3000 Index is used as the proxy for the US market. The proxies for the non-US developed and emerging markets are the respective developed country and emerging country portions from the MSCI All Country World IMI ex USA Index.

Somewhat, but not entirely, by design, the book-to-market (BtM) ratio for value stocks is relatively stable across the broad market categories. Once again, capturing broad exposure to the Value premium requires investment in a significant number of securities.

**Table 3: Markets Breakdown by Book-to-Market Ratio**

Sector	Total Value (\$mm)		Wtd Avg Market Cap	BtM	Securities
<b>United States</b>					
Growth	2,642,234	22.8%	71,155	0.19	477
Neutral	5,657,862	48.9%	60,800	0.49	1,467
Value	3,272,768	28.3%	53,226	1.08	1,050
<b>Non-US Developed Markets</b>					
Growth	2,941,074	26.3%	46,006	0.29	818
Neutral	5,310,962	47.5%	36,838	0.66	1,446
Value	2,933,042	26.2%	33,084	1.21	1,367
<b>Emerging Markets</b>					
Growth	903,800	26.4%	25,264	0.24	566
Neutral	1,491,391	43.6%	48,461	0.48	810
Value	1,028,917	30.1%	28,173	1.05	1,269

As of July 2010. The Russell 3000 Index is used as the proxy for the US market. The proxies for the non-US developed and emerging markets are the respective developed country and emerging country portions from the MSCI All Country World IMI ex USA Index.

#### IV. Managing Exposure to Desired Risk Factors

In line with relevant research and the goals of our equity strategy, PW&Co anchors its allocation to each global market (US, International and Emerging Markets) with a “core” fund which holds a broad cross section of securities. “Satellite” funds are then used to fine-tune the market exposure. This section will consider the decision to add certain additional funds beyond the “core” from the perspective of a U.S. investor.

##### A. International Small Cap and Value

Higher expected returns and greater diversification benefits, which can lower the overall risk of a portfolio, are the main reasons to invest in a new asset class. As displayed in Figure 5, U.S. & international large cap equities have had similar average returns since 1975 and increasingly higher correlations (.33 from 1975-1996, .87 from 1997-2009) as markets have become increasingly global, implying that international large cap equities may have very limited diversification benefits to a U.S. domestic investor’s portfolio.

Indeed, research has concluded that a market-like allocation to international equities did not provide enough diversification benefits to justify investing internationally.<sup>9</sup> However, the same research concluded that international small and value stocks had the higher average returns and diversification efficacy that a market-like allocation lacks, making them good candidates for international diversification of U.S. portfolios.

Figure 5: Asset Class Portfolios in Developed Markets (1975-2009)

	Return	Risk	S&P 500 Correlation	
			1975-1996	1997-2009
S&P 500 Index	11.7%	15.4%	1.00	1.00
MSCI EAFE Index	11.5%	17.4%	0.33	0.87
Dimensional International Small Cap Index	15.6%	18.1%	0.08	0.70
MSCI EAFE Growth Index	9.4%	17.9%	0.37	0.87
MSCI EAFE Value Index	13.3%	17.4%	0.27	0.85

Note: Return is measured as annualized compound monthly returns from January 1975 through December 2009. Risk is measured as annualized standard deviation of monthly returns. Correlation is measured as the correlation of annual returns.

The lower correlation of international small companies to U.S. large companies reflects the fact that smaller companies should be more indigenous to local markets. We conclude that the diversification benefits of investing in international small and value stocks are much greater than the diversification benefits of investing in a market-like allocation to international equities. Accordingly, we have sought to increase exposure to international small cap and value stocks beyond the “core” funds by adding additional funds.

## B. Emerging Markets Small Cap and Value

The research on emerging market stock returns also reveal strong size, and particularly value, effects.<sup>10</sup> Summary statistics since the inception of relevant emerging market indices are below:

Figure 6: Summary Statistics in Emerging Markets (1989-2009)

	Return	Risk	Correlation	
			Russell 3000	EAFE
Russell 3000 Index	9.3%	15.1%	1.00	0.76
MSCI EAFE Index	4.7%	17.5%	0.76	1.00
MSCI Emerging Mkts Index	12.7%	24.7%	0.56	0.76
Fama/French Emerging Mkts Small Cap Index	14.6%	25.0%	0.47	0.75
Fama/French Emerging Mkts Growth Index	10.8%	24.0%	0.53	0.74
Fama/French Emerging Mkts Value Index	18.0%	25.9%	0.47	0.79

Note: Return is measured as annualized compound return from January 1989 through December 2009. Risk is measured as annualized standard deviation of monthly returns. Correlation is measured as the correlation of annual returns.

Small and value stocks in emerging markets have had higher average returns than the broad emerging market universe and a low correlations with developed markets. The higher risk of emerging market stocks (partly because of lower liquidity, higher political and economic risk, and weaker legal and economic institutions relative to developed countries) is manifested in much higher standard deviation of returns relative to popular developed market indices.

As higher expected returns and greater diversification are the main reasons to invest in a new asset class, we conclude that a prudent allocation to emerging market stocks can improve the risk/return profile of a U.S. investor's portfolio. Accordingly, we have sought to increase exposure to emerging markets small cap and value stocks beyond the "core" fund by adding additional funds.

## C. U.S. Real Estate Investment Trusts ("REITs")

Equity REITs are companies that own and often manage income-producing real estate properties and meet certain requirements as set by law.<sup>11</sup> Academic research has shown that REITs mirror the performance of the real estate market, despite being a small part of that market.<sup>12</sup>

REITs tend to be small capitalization issues. Because of their generally low market price relative to fundamentals such as book value, REITs are often compared to small cap value stocks and included in small cap value portfolios. We can test the validity of this decision with a Fama-French three-factor regression run on the relevant indices, selected results of which are below:



Figure 7: Summary Statistics and Three-Factor Regression Statistics

	Return	Risk	Regression Factors			R <sup>2</sup>
			Mkt	Size	Value	
S&P 500 Index	11.3%	15.5%	0.99	-0.21	0.01	0.99
Dow Jones US Select REIT Index	12.1%	18.9%	0.83	0.53	0.87	0.59
Fama/French US Small Value Research Index	17.3%	18.4%	1.00	0.83	0.68	0.98
CRSP Deciles 6-10 (US Small Cap)	13.0%	20.8%	1.06	0.84	0.16	0.98

Note: Return is measured as annualized compound return from January 1978 through December 2009. Risk is measured as annualized standard deviation of monthly returns.

If REITs were a well-diversified subset of an asset class, a model that can explain the average expected returns of that asset class should be able to explain equally well the returns of any subset of the asset class, which is not the case here: the Fama/French model can only explain 59% of the variation in the returns of equity REITs compared to 98% for the small cap value and small cap portfolios.<sup>13</sup> And, the “subset” should have similar exposure to the risk factors that determine expected returns of the “umbrella” asset class; but, as observed in Figure 7, Equity REITs have a lower sensitivity to the market factor and size factor than small cap value stocks.

From this observation, we can determine that REITs have independent risk and return characteristics that make them a separate asset class.

#### D. International REITs

We consider it important to consider non-U.S. REITs separately from U.S. REITs, as the dominant position of the U.S. REIT market implies that any allocation to a “Global” REIT strategy for an investor with a prior allocation to U.S. REITs could create problems in managing allocations. As shown in Figure 9, U.S. REITs are not highly correlated with Non-U.S. REITs. Between 1990-2005, the correlation coefficient between the U.S. REIT market and the Non-U.S. REIT market was 0.54. With the real estate market troubles of 2007-2009, this correlation increased to 0.75.

Figure 8: Summary Statistics, Global REIT Indices (1990-2009)

	Return	Risk	Correlation	
			US REIT	Global REIT
Dow Jones US Select REIT Index	8.7%	20.4%	1.00	0.96
S&P Global ex US REIT Index	6.4%	15.5%	0.75	0.89
S&P Global REIT Index	8.2%	16.5%	0.96	1.00

Note: Returns are from January 1990 through December 2009. Risk is measured as annualized standard deviation of monthly returns. Correlation is measured as the correlation of annual returns.

In the analysis displayed as Figure 9, we also examine the correlation of international REITs to their own public equity markets.



Figure 9: International REIT Correlations with Their Own Public Equity Markets<sup>14</sup>

	U.S.	Australia	Holland	Belgium	Canada	Japan	New Zealand
15 Years	0.34	0.76	0.52				
10 Years	0.34	0.77	0.54	0.49	0.60		
5 Years	0.43	0.68	0.53	0.43	0.67	0.33	0.59

Source: Rodriguez, L. Jacobo. "Research Update: International Real Estate Investment Trusts." *Quarterly Institutional Review*, Dimensional Fund Advisors, Second Quarter 2007. Returns are from periods ending March 2007.

Even considering the increased correlation between U.S. and non-U.S. REITs during the economic recession of 2007-2009, an allocation to an international REIT strategy looks to have substantial diversification benefits for U.S. investors who already have exposure to U.S. REITs. Data in Figure 9 indicate that the diversification benefits of international REITs do not disappear in the presence of an allocation to international equities. We conclude that an investment in international REITs makes a useful allocation to our model portfolio.

## V. Implementation

Within the equity category, a "core-satellite" approach is used to implement the investment theory, in line with the research and data that we have discussed. Three core funds anchor PW&Co's allocation to each broad equity market: U.S., International and Emerging Markets. Each of these funds holds a broad cross section of securities but holds relatively more small cap and value stocks than a market-weighted portfolio. Benefits of core funds include immediate broad diversification, targeted exposure to relevant risk factors, and lower and less expensive turnover (because the net exposure of the entire core fund is considered, stock migration between asset classes doesn't trigger automatic transactions as it would for a portfolio built entirely of individual asset class funds).

Additional funds are used to further increase the desired tilts to small cap, value in the U.S. and International markets as well as U.S. and International real estate. The funds are selected to achieve a portfolio-wide exposure to the market, small cap and value factors while limiting the amount of variation, referred to as tracking error,<sup>15</sup> of the entire portfolio from the U.S. market return.

In selecting funds, a primary goal of PW&Co is capturing the premiums as effectively as possible (and, therefore, increase expected return) through effective diversification and continuous exposure.

## VI. Conclusion

Application of Modern Portfolio Theory allows us to increase *expected* risk-adjusted return by tilting broadly diversified portfolios to suit our preferred exposure to important risk factors, given investor-specific parameters related to tracking error and limiting maximum loss. In formulating expectations of risk, return and correlations, we rely on the long-term history (as long a term as is available) of the investment performance of each asset class as the best basis for estimates, notwithstanding the fact that we know that the future may not be like the past. We interpret this history in light of fundamental principles of finance documented in academic research.

Goodloe H. White, CFA  
Tim J. Heaven, Jr.  
September 20, 2010

## IMPORTANT NOTICE

This paper is intended to provide information to investors. Whether to invest in certain asset classes or in equities generally is a decision to be made on the basis of current market conditions and the circumstances of each investor. In addition, investors should be aware of the investment principles listed below.

- i. Past performance is not a guarantee of future results. Values change frequently and past performance may not be repeated. There is always the risk that an investor may lose money. Even a long-term investment approach cannot guarantee a profit. Economic, political, and issuer-specific events will cause the value of securities, and the portfolios that own them, to rise or fall.
- ii. Different types of investments involve varying degrees of risk, and there can be no assurance that any specific investment will either be suitable or profitable for a client's investment portfolio. In this document, risk is equated to standard deviation, which may be an incomplete measure of risk.
- iii. The returns and other characteristics of the allocation mixes contained in this presentation are based on models and back-tested simulations to demonstrate broad economic principles. They were achieved with the benefit of hindsight and do not represent actual investment performance.
- iv. Indexes are not available for direct investment; therefore, their performance does not reflect expenses associated with management of an actual portfolio.
- v. Historical performance results for investment indexes, or categories, generally do not reflect the deduction of transaction or custodial charges or the deduction of an investment management fee, the incurrence of which would have the effect of decreasing historical performance results.
- vi. Sample returns are not intended to illustrate the returns of clients of Porter, White & Company. Sample and model results do not reflect actual trading and do not illustrate the impact that material economic and market factors may have had on the returns if an adviser implemented these strategies with client funds. Furthermore, advisory fees would reduce these returns.
- vii. Information presented is believed to be factual and up-to-date, but we do not guarantee its accuracy and it should not be regarded as a complete analysis of the subjects discussed. All expressions of opinion reflect the judgment of the authors as of the date of publication and are subject to change.
- viii. Information presented does not involve the rendering of personalized investment advice, but is limited to the dissemination of general information on products and services. A professional adviser should be engaged before implementing any of the options presented.
- ix. Economic factors, market conditions, and investment strategies will affect the performance of any portfolio and there are no assurances that it will match or outperform any particular benchmark.

## VII. Appendix - Bibliography

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## VIII. Sources & Descriptions of Data

Data series are listed alphabetically under the figure heading where they are first introduced.

### CRSP Deciles 6-10

Source: CRSP, total returns in USD\$

Small Company Universe Returns (Deciles 6-10) - All Exchanges

Oct 1988 - Present : CRSP Deciles 6-10 Cap-Based Portfolio

Jan 1973 - Sep 1988: CRSP Database (NYSE & AMEX & OTC), Rebal. Quarterly

Jul 1962 - Dec 1972: CRSP Database (NYSE & AMEX), Rebal. Quarterly

Jan 1926 - Jun 1962: NYSE, Rebalanced Semi-Annually

### Dimensional International Small Cap Index

Not available for direct investment. Performance does not reflect the expenses associated with the management of an actual portfolio.

January 1994 - Present: Simulated by Dimensional from Bloomberg securities data. Returns computed from the average of four staggered, market cap-weighted annually rebalanced portfolios of small company securities. Small companies defined as the bottom 10% of the market ranked by market cap. REITs are excluded. Maximum index weight of any one company is capped at 5%.

Countries included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Switzerland, Sweden, United Kingdom.

July 1981 - December 1993: Simulated by Dimensional from StyleResearch securities data.

Includes securities of MSCI EAFE countries in the bottom 10% of market capitalization, excluding the bottom 1%.

All securities are market capitalization weighted. Each country is capped at 50%.

Rebalanced semiannually.

January 1970-June 1981: 50% Hoare Govett Small Companies Index (hgsmall.ind),

50% Nomura Small Companies Index (nomura.ind)

### Dow Jones US Select REIT Index

Total Returns in USD

April 2009 - present: Dow Jones US Select REIT Index

Source: Dow Jones Indexes

January 1978 - March 2009: Dow Jones Wilshire REIT Index

Source: Dow Jones Wilshire

Composition: U.S. publicly traded Real Estate Investment Trusts weighted by float-adjusted market capitalization

### Fama/French US Small Value Research Index

Composition: The index portfolios for July of year  $t$  to June  $t+1$  include all NYSE, AMEX, and NASDAQ stocks for which we have market equity for December  $t-1$  and June of  $t$ , and (positive) book-to-market equity data for fiscal year ending in  $t-1$ .

Exclusions: ADRs, Investment Companies, Tracking Stocks, non-US incorporated companies, Closed-end funds, Certificates, Shares of Beneficial Interests, and negative book values.

Sources: CRSP databases for returns and market capitalization: 1926 - present. Compustat and hand-collected book values: 1926 - present. CRSP links to Compustat and hand-collected links: 1926 - present.

Breakpoints: "The size breakpoint is the market capitalization of the median NYSE firm, so the big and small categories contain the same number of eligible NYSE firms. The BtM breakpoints split the eligible NYSE firms with positive book equity into three categories: 30% of the eligible NYSE firms with positive BE are in Low (Growth), 40% are in Medium (Neutral), and 30% are in High (Value)."

Rebalancing: Annual (at the end of June) 1926-2005.

### Fama/French Emerging Markets Growth Index

Total Returns in USD

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#### January 1989-Present: Fama/French Emerging Markets Growth Simulated Portfolio

Courtesy of Fama/French from IFC securities data. Simulated strategy of IFC investable universe countries in the lower 30% book-to-market range; companies weighted by float-adjusted market cap; countries weighted by country float-adjusted market cap; rebalanced monthly.

Source: "Value versus Growth: The International Evidence," Journal of Finance 53 (1998), 1975-99.

#### Fama/French Emerging Markets Small Cap Index

Total Returns in USD

#### January 1989-Present: Fama/French Emerging Markets Small Cap Simulated Index

Courtesy of Fama/French from IFC securities data. Simulated strategy using IFC investable universe countries. Companies in the bottom 30% of aggregate market cap; companies weighted by float-adjusted market cap; countries weighted by country float-adjusted market cap; rebalanced monthly.

Source: "Value versus Growth: The International Evidence," Journal of Finance 53 (1998), 1975-99.

#### Fama/French Emerging Markets Value Index

Total Returns in USD

#### January 1989-Present: Fama/French Emerging Markets Value Simulated Index

Courtesy of Fama/French from IFC securities data. Simulated strategy of IFC investable universe countries in the upper 30% book-to-market range; companies weighted by float-adjusted market cap; countries weighted by country float-adjusted market cap; rebalanced monthly.

Source: "Value versus Growth: The International Evidence," Journal of Finance 53 (1998), 1975-99.

#### MSCI EAFE Index

January 1970 - Present: MSCI EAFE Index (gross div.)

Total Returns Gross Dividends in USD

Source: MSCI

#### MSCI EAFE Growth Index

January 1975 - Present: MSCI EAFE Growth Index (Gross Div.)

Total Returns Gross Dividends in USD

Source: MSCI from Datastream

#### MSCI EAFE Value Index

January 1975 - Present: MSCI EAFE Value Index (Gross Div.)

Total Returns Gross Dividends in USD

Source: MSCI from Datastream

#### MSCI Emerging Markets Index

Total returns gross dividends in USD

January 1970 - Present: MSCI Europe ex UK Index (Gross div.)

Source: MSCI

#### Russell 3000 Index

Source: Russell, total returns in USD\$

Jan 1979-Present: Russell 3000 Index

#### S&P 500 Index

Total returns in USD.

January 1990-Present: S&P 500 Index. The S&P Data are provided by Standard & Poor's Index Services Group.

January 1926-December 1989: S&P 500 Index. Ibbotson data courtesy of © Stocks, Bonds, Bills and Inflation Yearbook™, Ibbotson Associates, Chicago (annually updated works by Roger C. Ibbotson and Rex A. Sinquefeld).

#### S&P Global ex US REIT Index

October 2008 - Present: S&P Global ex US REIT Index (gross div.)

July 1989 - September 2008: S&P/Citigroup Global ex US REIT Broad Market Index (gross div.)  
Total Returns Gross Dividends in USD  
Source: S&P

S&P Global REIT Index

October 2008 - Present: S&P Global REIT Index (gross div.)  
July 1989 - September 2008: S&P/Citigroup Global REIT Broad Market Index (gross div.)  
Total Returns Gross Dividends in USD  
Source: S&P

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- <sup>1</sup> White, Goodloe H. "Selecting Asset Classes for Portfolios," *Porter, White & Company White Paper* No. IM 20.1.
- <sup>2</sup> See: American Law Institute. (1992). *Restatement of the Law Third, Trusts - Prudent Investor Rule*. St. Paul, Minnesota: American Law Institute Publishers; & "Uniform Prudent Investor Act: Final Act." The National Conference of Commissioners on Uniform State Laws. <http://www.law.upenn.edu/bll/archives/ulc/fnact99/1990s/upia94.pdf>.
- <sup>3</sup> Assumptions for monthly average returns and standard deviations of monthly returns: Asset A (.5% / 2.24%); Asset B (1.0%, 3.16%). Assumed returns correlation of 0.5.
- <sup>4</sup> For instance, see Philips, Christopher B. "International Equity: Considerations and Recommendations." *Vanguard Investment Counseling and Research*. Domestic and international allocations are represented by S&P 500 Index for 1970 and Dow Jones Wilshire 5000 Index from 1971-2005. International stocks are represented by MSCI World Index ex USA.
- <sup>5</sup> Fama, Eugene F. and Kenneth R. French. 1992. "The Cross Section of Expected Stock Returns." *Journal of Finance*, 43, 995-1007. Also see Eugene F. Fama and Kenneth R. French, "Common Risk Factors in Stock and Bond Returns," *Journal of Financial Economics* 33, no. 1 (February 1993): 3-56.
- <sup>6</sup> Capul, Carlo, Ian Rowley, and William F. Sharpe, "International Value and Growth Stock Returns," *Financial Analysts Journal* 49 (1993): 27-36. Also, see: Fama, Eugene F., and Kenneth R. French, "Value Versus Growth: The International Evidence," *Journal of Finance* 53 (1998): 1975-1999.
- <sup>7</sup> Up until Fama/French, stock risk was generally considered to stem from exposure to the market: stocks highly exposed to market cycles were considered risky, and stocks whose returns were largely independent of market movements were considered less risky. Fama/French added two factors that capture substantial variation in the cross-section of average stock returns: size and "value," as measured by a stock's book-to-market ratio.
- <sup>8</sup> In US dollars. Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio. US value and growth index data (ex utilities) provided by Fama/French. The S&P data are provided by Standard & Poor's Index Services Group. CRSP data provided by the Center for Research in Security Prices, University of Chicago. International Value data provided by Fama/French from Bloomberg and MSCI securities data. International Small data compiled by Dimensional from Bloomberg, StyleResearch, London Business School, and Nomura Securities data. MSCI EAFE Index is net of foreign withholding taxes on dividends; copyright MSCI 2010, all rights reserved. Emerging markets index data simulated by Fama/French from countries in the IFC Investable Universe; simulations are free-float weighted both within each country and across all countries.



<sup>9</sup> Siquefield, Rex A., “Where Are the Gains from International Diversification?” *Financial Analysts Journal* 52, no.1 (January-February 1996): 8-14. In “Where Are the Gains from International Diversification?: An Update,” L. Jacobo Rodriguez extends the sample period to 2005 to confirm validity of the conclusions) *Quarterly Institutional Review*, Dimensional Fund Advisors, Third Quarter 2006).

<sup>10</sup> Fama, Eugene F., and Kenneth R. French, “Value Versus Growth: The International Evidence,” *Journal of Finance* 53 (1998): 1975-1999.

<sup>11</sup> To qualify as a REIT, a company must meet, among others, the following two requirements: (1) it must invest at least 75% of its assets in real estate and derive at least 75% of its income from real estate property or interest on real estate financing, and (2) a company must distribute at least 90% of its taxable income to its shareholders. Because REITs can deduct the dividends paid to shareholders from their taxable corporate income, many REITs distribute 100% of their taxable income to their shareholders in the form of dividends. This tax pass-through allows REIT investors to have access to the same cash flows as investors in private real estate equity.

<sup>12</sup> See, for instance, Joseph Gyourko and Donald B. Keim, “Risk and Return in Real Estate: Evidence from a Real Estate Stock Index,” *Financial Analysts Journal* 49, no.5 (September-October 1993): 39-46. Also see Gyourko and Keim, “What Does the Stock Market Tell Us about Real Estate Returns?” *Journal of the American Real Estate and Urban Economics Association* 20, no. 3 (September 1992): 457-85.

<sup>13</sup> As evidenced by the coefficient of determination ( $R^2$ ).  $R^2$  is the proportion of variability in a data set that is accounted for by the statistical model.

<sup>14</sup> Rodriguez, L. Jacobo. “Research Update: International Real Estate Investment Trusts.” *Quarterly Institutional Review*, Dimensional Fund Advisors, Second Quarter 2007.

<sup>15</sup> Tracking error is defined as the standard deviation of the difference in the portfolio return from the market. The higher the tracking error, the greater the periodic difference in the return of the portfolio from the market.

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