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“Eugene Fama and Robert Shiller represent very different views on unresolved issues.”

Two Nobel Laureates... Two Tales of Value

Value investing is a strategy of buying stocks with low price-to-fundamentals ratios and selling stocks with high ones. It has been shown that value investing is one of the few investment strategies to generate a premium in most markets and periods. Value stocks generally move in concert. This co-movement, the foundation of traditional style-based investing, limits the efficiency of the average value strategy. Die-hard proponents of the Efficient Market Hypothesis (EMH) would argue that this is an inescapable destiny; if you want to be compensated with higher return, you must take on value risk. We hold, on the contrary, that value investors are not destined to accept this risk. An implementation that is sensitive to value risk can significantly decrease the strategy's relative exposure.

Two Nobel Theories

The 2013 list of Nobel prizewinners in economics and finance was a balanced ticket. Two of the new Laureates, Eugene Fama and Robert Shiller, have made praiseworthy contributions to our understanding of markets and prices, yet they represent very different views on unresolved issues in finance.

Eugene Fama starts from the position that markets are very efficient. If value stocks

generate a premium, then in some way they must be riskier. He observes that value stocks tend to co-move with each other and reasons that the correlation of value portfolio holdings must be the locus of the risk for which market participants are compensated. The exact source of value risk has not been identified, but advocates of the EMH have variously argued that it may be related to distress, illiquidity, or some rare and elusive events.

Robert Shiller speaks for the behavioral camp, whose adherents would argue that investors subscribing to the value strategy buy cheap stocks and sell expensive ones. How do stocks become cheap or expensive? Market participants are susceptible to cognitive errors and other behavioral biases. Familiar examples include overconfidence, mental accounting, availability cascades, loss aversion, overreacting to news, and herding. It is not inconceivable that investors, behaving irrationally, can misprice some stocks or even be wrong about entire market segments.

In the presence of so many and such pervasive behavioral quirks, the question is not “how efficient are financial markets?” but “how can we trust prices to be efficient at all?” The short answer is that prices are largely efficient



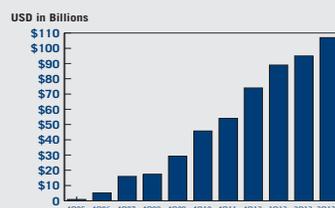
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because arbitrageurs energetically exploit mispricing. Arbitrageurs can finance their trades against mispricing by borrowing and using investors' capital. Nonetheless, risk arbitrage positions can remain open for a while; if borrowing is limited and investors focus on short-term performance, arbitrageurs can be fired before the mispricing is corrected.

The efficient markets and behavioral perspectives offer different interpretations of the pricing mechanism. But their explanations of value investing are similar:

- stocks with low price-to-fundamentals ratios (value stocks) outperform stocks with high price-to-fundamentals ratios; and
- value stocks tend to co-move with each other.

What Value Risk Is Not

Given that the predictions based upon risk and mispricing are quite tangled, it is useful to say what value risk is not. As mentioned above, EMH proponents initially suspected that the value premium might be the reward for assuming default risk. However, this proposition has been disproven. Dichev (1998) was the first to show that default risk does not generate a premium. More recently, research conducted by Piotroski and So (2012) has demonstrated that value stocks with low probability of default are responsible for the majority of the value premium.

Illiquidity was the second early suspect for the source of value risk, and in time Pástor and Stambaugh (2003) demonstrated that illiquidity does indeed earn a premium. Illiquidity risk, however, does not explain the value effect. Even after

“Arbitrageurs can be fired before mispricing is corrected.”

controlling for all illiquidity risk, enough excess return is left over to account for the value premium.

With no obvious culprits like distress or illiquidity remaining under suspicion, advocates of the risk explanation suggest that the value premium must be due to hard-to-measure systemic risk or the remote likelihood of a catastrophic event—the low frequency, high impact (LFHI) kind of event that risk managers find so challenging to model.

The Skein of Risk and Cheapness

The risk and mispricing theories are unhelpfully intertwined. Daniel and Titman (1997) suggested a way to disentangle them. Consider two examples.

Example 1: Eugene's Portfolio—Safe vs. Risky. Two companies, Risky Corp. and Safe Inc., have exactly the same book-to-market (B/M) ratios of 0.6. Risky Corp. co-moves strongly with other value companies; its value loading is 0.5. Safe Inc. co-moves with growth stocks; its value loading is negative 0.5. Eugene, an investor, decides to create a long-short portfolio containing the two stocks. He goes long Risky Corp. and short Safe Inc.

Example 2: Robert's Portfolio—Safe vs. Cheap. Two similar companies, Cheap Corp. and Expensive Inc., both have a value loading of 0.1. However,

they have markedly different B/M ratios. Cheap Corp. has a B/M ratio of 0.8; Expensive Inc., 0.4. Robert, another investor, decides to go long Cheap Corp. and short Expensive Inc.

What investment outcomes should Eugene and Robert expect? Logically, these two portfolios will have very different results, depending on which theory of value is correct.

According to the risk-based theory, value risk is compensated with higher expected return. If variations in the B/M ratio do not reflect the riskiness of the portfolio, they will have no performance effect. Eugene's strategy of buying risky securities and selling safe ones will induce a lot of value risk loading in the portfolio. Robert's portfolio has offsetting positions in stocks with exactly the same value risk loading. If the risk theory is true, Eugene's expected return is high, while Robert's is zero. The performance of both portfolios is completely explained by the traditional risk factors (market, value, size, and momentum), leaving no room for risk-adjusted alpha.

According to the mispricing theory, risk loadings are irrelevant for return predictions. Rather, it is variations in B/M ratios, reflecting the relative cheapness of stocks, that help predict returns. Accordingly, Eugene's strategy of buying risky but similarly priced securities would not translate into higher return. Robert's approach of buying cheap and selling expensive securities would generate a premium. Moreover, adjusting for risk factors would yield quite surprising results: Eugene's portfolio will generate negative alpha because it

has a high loading on the value risk factor, which is unrewarded with high returns. Robert’s portfolio will generate positive alpha because it has a high return and no loading on value risk.

Extending the Analysis to Global Results

A study by Chaves, Hsu, Kalesnik, and Shim (2013) simulated the performance of Eugene and Robert’s strategies in 23 developed countries. For each country, the starting year was selected by identifying the longest time horizon that contained at least 25 stocks in all subsequent months.¹

Table 1 reports summary statistics.

Eugene’s expanded portfolio, which had a material value risk factor loading but was indifferent to B/M characteristics, generated a statistically insignificant return of only 79 bps per annum. After controlling for traditional factor exposures, Eugene’s portfolio generated negative and statistically significant alpha of -1.74%.

Robert’s strategy was appreciably more fruitful. His expanded portfolio yielded an annualized return of 7.61% with a *t*-statistic of 4.65. The strategy delivered positive value added in all 23 developed

“Book-to-market characteristics are quite useful in return forecasting.”

countries. After controlling for the four traditional factors, Robert’s portfolio had an alpha of 3.01% with a highly significant *t*-statistic of 4.02.

Value risk exposures are of little use in predicting returns. Book-to-market characteristics, on the other hand, are quite useful in return forecasting. These findings strongly suggest that mispricing is the dominant driver of the value premium.

A Low-Correlation Value Portfolio

Apart from intellectual curiosity, why should we care whether risk or mispricing drives the value premium? Because if (as is the case) mispricing and not risk is responsible for value returns, then we can construct more efficient and powerful strategies to extract the value premium.

Let us first draw an intuition from the fixed income world. Fixed income securities

have predetermined payment structures. If we are planning to hold a default-free bond to maturity, then (given that we know the payment structure) the current market price is the only variable we need to calculate the bond’s yield over its entire remaining term. All the information the market may have used to value the bond, such as its estimated volatility and factor correlations—all this information is irrelevant once we know the price.

Similarly, Eugene and Robert’s portfolio results suggest that a company’s price-to-fundamentals ratios contain all the information we need. We know that value stocks tend to co-move with each other (as, of course, do growth stocks). Identifying stocks with cheap valuations which are *not* marching to the same drummer as other value stocks can diversify an otherwise unexceptional value strategy.

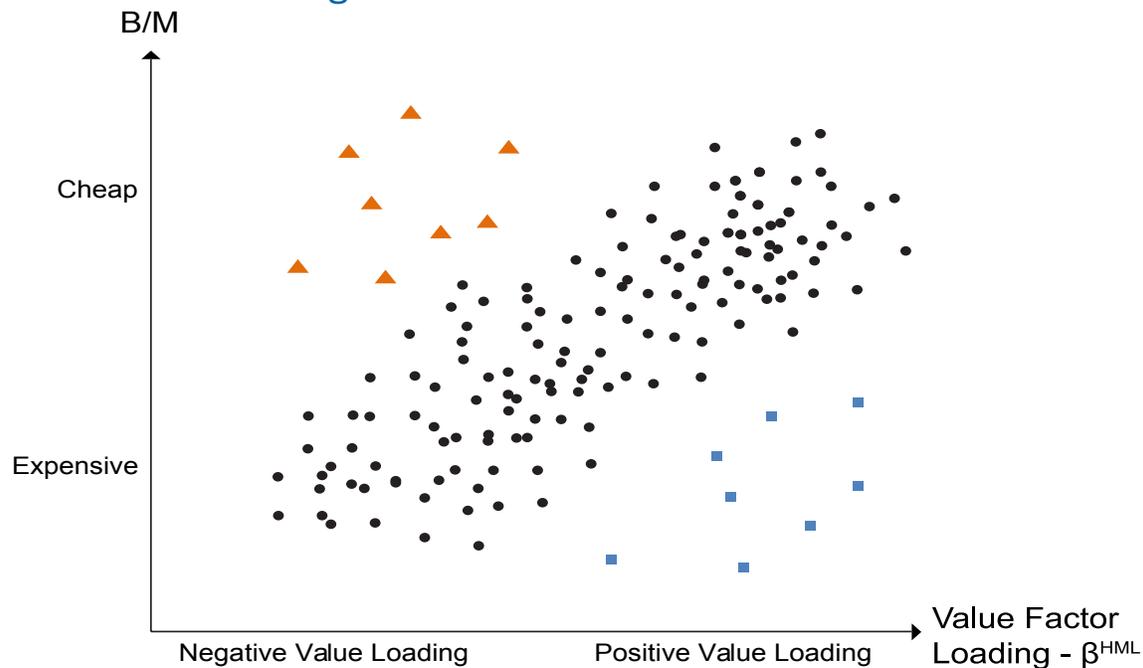
Figure 1 illustrates this concept by representing the two dimensions of interest: the B/M ratio on the vertical axis and value loading on the horizontal axis. Each dot represents a fictitious company. In this mockup, there is a dense cloud going from the lower left corner to upper right. Cheap value companies tend to have higher value loadings, and more expensive growth companies tend to have negative loadings on the value factor.

Table 1. Mispricing vs. Risk Tests for Value Premium

Summary Statistic	Eugene’s Portfolio			Robert’s Portfolio		
	Return	t-statistic	# Positive in 23 Developed Countries	Return	t-statistic	# Positive in 23 Developed Countries
Average Performance (Annualized)	0.79%	0.84	57%	7.61%	4.65	100%
Average Alpha (Annualized)	-1.74%	-2.09	17%	3.01%	4.02	87%

Source: Summary statistics from Chaves, Hsu, Kalesnik, and Shim (2013).

Figure 1. Two Dimensions of Value



Source: Research Affiliates.

On the chart we also marked two separate groups of stocks with distinctive colors and symbols. The companies represented by orange triangles have high B/M ratios and tend to co-move more strongly with growth companies (negative value loading). The companies indicated by blue squares are generally expensive growth companies which tend to co-move with value companies.

The stocks in Figure 1 are made-up. However, Dell at some point in time might be taken as an example of an orange-triangle company. Despite Dell's strong fundamentals, the market was not very optimistic about its prospects. So, on several fundamentals-to-price ratios, Dell was a value company. Nonetheless, as a technology company, Dell tends to co-move strongly with other tech companies, and they generally have low B/M ratios.

In the same way, Berkshire Hathaway might exemplify a blue-square company. The general public believes that CEO Warren Buffett has the Midas touch, and at some point in time Berkshire Hathaway was priced as an expensive company. All the same, it is still a financial company. If most other financial companies were priced cheaply, Berkshire Hathaway would be strongly co-moving with value companies.

Consider a portfolio which buys cheap stocks that tend to co-move with growth stocks (orange-triangle companies) and sells expensive companies which tend to co-move with value stocks (blue-square companies). We call this a low-correlation value portfolio.

Table 2 displays the four-factor alpha of this strategy simulated in 23 developed markets. The average alpha of the

low-correlation strategy is 7.52% per annum. The alpha is positive in 20 out of 23 developed markets and statistically significant in 7 out of 23 countries. In the United States, where we had by far the longest back-test period (1927-2011), the alpha is 5.43%, and it is highly statistically significant.

Conclusion

Empirical evidence suggests that the value premium is driven by mispricing and that fundamentals-to-price ratios are good indicators of future outperformance. The more value stocks are correlated, the harder it is for risk arbitrageurs to squeeze out mispricing. But risk does not cause mispricing. An effective implementation of the value strategy can significantly mitigate the active risk. The low-correlation value strategy proposed here is one way to manage value risk and achieve superior risk-reward characteristics.

Table 2. Low Correlation Value Portfolio
Four Factor Alpha in 23 Developed Markets

Country	Alpha (Annual)	t-statistics	Start year
Australia	4.07%	0.61	1982
Austria	28.05%	3.33**	1987
Belgium	15.27%	2.02**	1987
Canada	14.46%	2.34**	1982
Denmark	15.61%	1.99**	1986
Finland	12.93%	1.16	1990
France	6.61%	1.19	1982
Germany	-0.70%	-0.14	1982
Greece	11.43%	0.98	1989
Hong Kong	0.57%	0.07	1991
Ireland	13.77%	1.22	1985
Italy	2.17%	0.33	1982
Japan	1.28%	0.40	1982
Netherlands	14.81%	2.25**	1982
New Zealand	-4.31%	-0.46%	1990
Norway	8.64%	0.89	1987
Portugal	0.95%	0.09	1989
Singapore	0.67%	0.12	1988
Spain	9.04%	1.29	1988
Sweden	-8.18%	-1.26	1985
Switzerland	15.31%	2.52**	1982
United Kingdom	5.07%	1.24	1982
United States	5.43%	2.84**	1927
Average	7.52%		

**Represents statistical significance at 5% level.

Source: Research Affiliates using data from CRSP, Compustat, Worldscope, Datastream, and the website of Kenneth French.

Endnote

1. The average number of stocks for a particular country was 445, and the average starting year was 1983.

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Performance Update

FTSE RAFI® Equity Index Series*

TOTAL RETURN AS OF 10/31/13	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED			
				3 YEAR	5 YEAR	10 YEAR	10 YEAR VOLATILITY
FTSE RAFI® All World 3000 ¹	TFRAW3	22.83%	28.64%	10.86%	15.95%	10.66%	18.63%
MSCI All Country World ²	GDUEACWF	19.56%	23.95%	10.95%	14.09%	8.21%	16.61%
FTSE RAFI® Developed ex US 1000 ³	FRXIXTR	22.60%	30.34%	7.60%	13.42%	9.22%	20.33%
MSCI World ex US ⁴	GDDUWXUS	18.99%	25.21%	8.34%	12.47%	8.38%	18.29%
FTSE RAFI® Developed ex US Mid Small ⁵	TFRDXUSU	20.95%	27.83%	9.57%	19.27%	11.85%	18.88%
MSCI World ex US Small Cap ⁶	GCUDWXUS	22.89%	28.26%	9.91%	18.65%	10.02%	20.22%
FTSE RAFI® Emerging Markets ⁷	TFREMU	-2.10%	3.81%	-1.10%	14.97%	16.40%	24.49%
MSCI Emerging Markets ⁸	GDUEEGF	0.62%	6.90%	0.63%	15.76%	12.77%	23.90%
FTSE RAFI® 1000 ⁹	FRIOXTR	28.35%	31.67%	17.66%	19.00%	9.55%	17.15%
Russell 1000 ¹⁰	RU10INTR	26.08%	28.40%	16.83%	15.84%	7.83%	14.96%
S&P 500 ¹¹	SPTR	25.30%	27.18%	16.56%	15.17%	7.46%	14.66%
FTSE RAFI® US 1500 ¹²	FR15USTR	33.37%	40.23%	18.72%	22.44%	11.95%	21.71%
Russell 2000 ¹³	RU20INTR	30.90%	36.28%	17.69%	17.04%	9.03%	19.69%
FTSE RAFI® Europe ^{14**}	TFREUE	22.35%	27.39%	8.46%	11.59%	7.76%	17.52%
MSCI Europe ^{15**}	GDDLE15	18.04%	22.41%	10.20%	11.31%	7.14%	14.44%
FTSE RAFI® Australia ^{16**}	FRAUSTR	23.87%	29.21%	12.47%	12.19%	10.47%	13.56%
S&P/ASX 200 ^{17**}	ASA51	20.84%	25.48%	10.06%	11.10%	9.89%	13.63%
FTSE RAFI® Canada ^{18**}	FRCANTR	14.34%	17.74%	7.07%	11.86%	9.72%	13.51%
S&P/TSX 60 ^{19**}	TX60AR	10.40%	11.34%	4.79%	8.48%	8.47%	13.97%
FTSE RAFI® Japan ^{20**}	FRJPNTR	43.60%	70.46%	15.00%	9.27%	4.38%	19.77%
MSCI Japan ^{21**}	GDDLJN	41.23%	64.71%	15.71%	8.68%	3.32%	19.18%
FTSE RAFI® UK ^{22**}	FRGBRTR	19.62%	23.47%	10.81%	14.22%	9.01%	15.58%
MSCI UK ^{23**}	GDDLUK	17.68%	20.75%	9.90%	13.26%	8.40%	13.61%

*To see the complete series, please go to: http://www.ftse.com/Indices/FTSE_RAFI_Index_Series/index.jsp.

**The above indices have been restated to reflect the use of local currencies for all single country strategies and EUR for Europe regional strategies rather than USD.

Russell Fundamental Index Series*

TOTAL RETURN AS OF 10/31/13	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED			
				3 YEAR	5 YEAR	10 YEAR	10 YEAR VOLATILITY
Russell Fundamental Global Index Large Company ²⁴	RUFGLTU	23.49%	28.94%	12.53%	15.99%	10.75%	16.94%
MSCI All Country World Large Cap ²⁵	MLCUAWOG	19.13%	23.21%	10.86%	13.44%	7.81%	16.31%
Russell Fundamental Developed ex US Index Large Company ²⁶	RUFDXLTU	23.71%	31.54%	8.56%	13.05%	9.84%	18.43%
MSCI World ex US Large Cap ²⁷	MLCUWXUG	18.79%	25.04%	8.26%	11.94%	8.08%	18.18%
Russell Fundamental Developed ex US Index Small Company ²⁸	RUFDXSTU	24.32%	31.35%	11.81%	19.13%	11.90%	18.26%
MSCI World ex US Small Cap ⁶	GCUDWXUS	22.89%	28.26%	9.91%	18.65%	10.02%	20.22%
Russell Fundamental Emerging Markets ²⁹	RUFGETRU	2.28%	9.26%	2.87%	18.07%	16.95%	24.10%
MSCI Emerging Markets ⁸	GDUEEGF	0.62%	6.90%	0.63%	15.76%	12.77%	23.90%
Russell Fundamental US Index Large Company ³⁰	RUFUSLTU	27.65%	30.27%	18.18%	17.85%	9.92%	15.52%
Russell 1000 ¹⁰	RU10INTR	26.08%	28.40%	16.83%	15.84%	7.83%	14.96%
S&P 500 ¹¹	SPTR	25.30%	27.18%	16.56%	15.17%	7.46%	14.66%
Russell Fundamental US Index Small Company ³¹	RUFUSSTU	31.16%	38.01%	18.86%	22.54%	12.90%	20.71%
Russell 2000 ¹³	RU20INTR	30.90%	36.28%	17.69%	17.04%	9.03%	19.69%
Russell Fundamental Europe ^{32**}	RUFEUTE	20.83%	26.05%	9.57%	12.62%	9.19%	15.87%
MSCI Europe ^{15**}	GDDLE15	18.04%	22.41%	10.20%	11.31%	7.14%	14.44%

*To see the complete series, please go to: http://www.russell.com/indexes/data/Fundamental/About_Russell_Fundamental_indexes.asp.

**The above indices have been restated to reflect the use of local currencies for all single country strategies and EUR for Europe regional strategies rather than USD.

Performance Update

Fixed Income/Alternatives

TOTAL RETURN AS OF 10/31/13	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED			
				3 YEAR	5 YEAR	10 YEAR	10 YEAR VOLATILITY
RAFI® Bonds US Investment Grade Master ³³	—	-1.41%	-1.84%	4.79%	10.79%	5.82%	5.80%
ML Corporate Master ³⁴	COAO	-0.99%	-1.09%	4.88%	11.06%	5.55%	5.94%
RAFI® Bonds US High Yield Master ³⁵	—	4.08%	5.62%	8.65%	18.12%	9.49%	9.46%
ML Corporate Master II High Yield BB-B ³⁶	H0A4	5.44%	7.69%	8.51%	16.13%	8.08%	9.16%
RAFI® US Equity Long/Short ³⁷	—	9.82%	12.27%	3.83%	9.87%	5.13%	11.19%
1-Month T-Bill ³⁸	GB1M	0.03%	0.04%	0.06%	0.07%	1.51%	0.52%
FTSE RAFI® Global ex US Real Estate ³⁹	FRXR	9.83%	19.88%	7.89%	18.27%	—	—
FTSE EPRA/NAREIT Global ex US ⁴⁰	EGXU	5.53%	12.76%	6.84%	15.46%	—	—
FTSE RAFI® US 100 Real Estate ⁴¹	FRUR	9.38%	11.87%	12.75%	20.02%	—	—
FTSE EPRA/NAREIT United States ⁴²	UNUS	7.80%	11.47%	12.07%	14.97%	—	—
Citi RAFI Sovereign Developed Markets Bond Index Master ⁴³	CRFDMU	-0.23%	0.87%	3.06%	6.57%	5.99%	7.41%
Merrill Lynch Global Governments Bond Index II ⁴⁴	WOG1	-2.28%	-3.38%	0.97%	4.93%	4.99%	6.76%
Citi RAFI Sovereign Emerging Markets Local Currency Bond Index Master ⁴⁵	CRFELMU	-5.53%	-2.46%	—	—	—	—
JPMorgan GBI-EM Global Diversified ⁴⁶	JGENVUUG	-5.02%	-1.60%	—	—	—	—

Definition of Indices:

- (1) The FTSE RAFI® All World 3000 Index is a measure of the largest 3,000 companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value), across both developed and emerging markets.
- (2) The MSCI All Country World Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed and emerging markets.
- (3) The FTSE RAFI® Developed ex US 1000 Index is a measure of the largest 1000 non U.S. listed, developed market companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (4) The MSCI World ex US Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets, excluding the United States.
- (5) The FTSE RAFI® Developed ex US Mid Small Index tracks the performance of small and mid-cap companies domiciled in developed international markets (excluding the United States), selected and weighted based on the following four fundamental measures of firm size: sales, cash flow, dividends and book value.
- (6) The MSCI World ex US Small Cap Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of small cap developed markets, excluding the United States.
- (7) The FTSE RAFI® Emerging Markets Index comprises the largest 350 Emerging Market companies selected and weighted using fundamental factors (sales, cash flow, dividends, book value).
- (8) The MSCI Emerging Markets Index is an unmanaged, free-float-adjusted cap-weighted index designed to measure equity market performance of emerging markets.
- (9) The FTSE RAFI® 1000 Index is a measure of the largest 1,000 U.S. listed companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (10) The Russell 1000 Index is a market-capitalization-weighted benchmark index made up of the 1,000 highest-ranking U.S. stocks in the Russell 3000.
- (11) The S&P 500 Index is an unmanaged market index that focuses on the large-cap segment of the U.S. equities market.
- (12) The FTSE RAFI® US 1500 Index is a measure of the 1,001st to 2,500th largest U.S. listed companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (13) The Russell 2000 is a market-capitalization weighted benchmark index made up of the 2,000 smallest U.S. companies in the Russell 3000.
- (14) The FTSE RAFI® Europe Index is comprised of all European companies listed in the FTSE RAFI® Developed ex U.S. 1000 Index, which in turn is comprised of the largest 1,000 non U.S. listed developed market companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (15) The MSCI Europe Index is a free-float adjusted market capitalization weighted index that is designed to measure the equity market performance of the developed markets in Europe.
- (16) The FTSE RAFI® Australia Index is comprised of all Australian companies listed in the FTSE RAFI® Developed ex U.S. 1000 Index, which in turn is comprised of the largest 1,000 non U.S. listed developed market companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (17) The S&P/ASX 200 Index, representing approximately 78% of the Australian equity market, is a free-float-adjusted, cap-weighted index.
- (18) The FTSE RAFI® Canada Index is comprised of all Canadian companies listed in the FTSE RAFI® Developed ex U.S. 1000 Index, which in turn is comprised of the largest 1,000 non U.S. listed developed market companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (19) The S&P/Toronto Stock Exchange (TSX) 60 is a cap-weighted index consisting of 60 of the largest and most liquid (heavily traded) stocks listed on the TSX, usually domestic or multinational industry leaders.
- (20) The FTSE RAFI® Japan Index is comprised of all Japanese companies listed in the FTSE RAFI® Developed ex U.S. 1000 Index, which in turn is comprised of the largest 1,000 non U.S. listed developed market companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (21) The MSCI Japan Index is an unmanaged, free-float-adjusted cap-weighted index that aims to capture 85% of the publicly available total market capitalization of the Japanese equity market.
- (22) The FTSE RAFI® UK Index is comprised of all UK companies listed in the FTSE RAFI® Developed ex U.S. 1000 Index, which in turn is comprised of the largest 1,000 non U.S. listed developed market companies, selected and weighted using fundamental factors; (sales, cash flow, dividends, book value).
- (23) The MSCI UK Index is an unmanaged, free-float-adjusted cap-weighted index that aims to capture 85% of the publicly available total market capitalization of the British equity market.
- (24) The Russell Fundamental Global Index Large Company is a measure of the largest companies, selected and weighted using fundamental factors; (adjusted sales, retained cash flow, dividends + buybacks), across both developed and emerging markets.
- (25) The MSCI All Country World Large Cap Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed and emerging markets.
- (26) The Russell Fundamental Developed ex US Large Company is a subset of the Russell Fundamental Developed ex US Index, and is a measure of the largest non-U.S. listed developed country companies, selected and weighted using fundamental factors; (adjusted sales, retained cash flow, dividends + buybacks).
- (27) The MSCI World ex US Large Cap Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of large cap-developed markets, excluding the United States.
- (28) The Russell Fundamental Developed ex US Index Small Company is a subset of the Russell Fundamental Developed ex US Index, and is a measure of small non-U.S. listed developed country companies, selected and weighted using fundamental factors; (adjusted sales, retained cash flow, dividends + buybacks).
- (29) The Russell Fundamental Emerging Markets Index is a measure of Emerging Market companies, selected and weighted using fundamental factors; (adjusted sales, retained cash flow, dividends + buybacks).
- (30) The Russell Fundamental U.S. Index Large Company is a subset of the Russell Fundamental US Index, and is a measure of the largest U.S. listed companies, selected and weighted using fundamental measures; (adjusted sales, retained cash flow, dividends + buybacks).
- (31) The Russell Fundamental US Index Small Company is a subset of the Russell Fundamental US Index, and is a measure of U.S. listed small companies, selected and weighted using fundamental measures; (adjusted sales, retained cash flow, dividends + buybacks).
- (32) The Russell Fundamental Europe Index is a measure of European companies, selected and weighted using fundamental factors; (adjusted sales, retained cash flow, dividends + buybacks).
- (33) The RAFI® Bonds US Investment Grade Master Index is a U.S. investment-grade corporate bond index comprised of non-zero fixed coupon debt with maturities ranging from 1 to 30 years issued by publicly traded companies. The issuers held in the index are weighted by a combination of four measures of their fundamental size—sales, cash flow, dividends, and book value of assets.
- (34) The Merrill Lynch U.S. Corporate Master Index is representative of the entire U.S. corporate bond market. The index includes dollar-denominated investment-grade corporate public debt issued in the U.S. bond market.
- (35) The RAFI® Bonds US High Yield Master is a U.S. high-yield corporate bond index comprised of non-zero fixed coupon debt with maturities ranging from 1 to 30 years issued by publicly traded companies. The issuers held in the index are weighted by a combination of four measures of their fundamental size—sales, cash flow, dividends, and book value of assets.
- (36) The Merrill Lynch Corporate Master II High Yield BB-B Index is representative of the U.S. high yield bond market. The index includes domestic high-yield bonds, including deferred interest bonds and payment-in-kind securities. Issues included in the index have maturities of one year or more and have a credit rating lower than BBB-/Baa3, but are not in default.
- (37) The RAFI® US Equity Long/Short Index utilizes the Research Affiliates Fundamental Index® (RAFI®) methodology to identify opportunities that are implemented through long and short securities positions for a selection of U.S. domiciled publicly traded companies listed on major exchanges. Returns for the index are collateralized and represent the return of the strategy plus the return of a cash collateral yield.
- (38) The 1-Month T-bill return is calculated using the Bloomberg Generic 1-month T-bill. The index is interpolated based off of the currently active U.S. 1 Month T-bill and the cash management bill closest to maturing 30 days from today.
- (39) The FTSE RAFI® Global ex US Real Estate Index comprises 150 companies with the largest RAFI fundamental values selected from the constituents of the FTSE Global All Cap ex US Index that are classified by the Industry Classification Benchmark (ICB) as Real Estate.
- (40) The FTSE EPRA/NAREIT Global ex US Index is a free float-adjusted index, and is designed to represent general trends in eligible listed real estate stocks worldwide, excluding the United States. Relevant real estate activities are defined as the ownership, trading and development of income-producing real estate.
- (41) The FTSE RAFI® US 100 Real Estate Index comprises of the 100 U.S. companies with the largest RAFI fundamental values selected from the constituents of the FTSE USA All Cap Index that are classified by the Industry Classification Benchmark (ICB) as Real Estate.
- (42) The FTSE EPRA/NAREIT United States Index is a free float-adjusted index, is a subset of the EPRA/NAREIT Global Index and the EPRA/NAREIT North America Index and contains publicly quoted real estate companies that meet the EPRA Ground Rules. EPRA/NAREIT Index series is seen as the representative benchmark for the real estate sector.
- (43) The Citi RAFI Sovereign Developed Markets Bond Index Series seeks to reflect exposure to the government securities of a universe of 23 developed markets. By weighting components by their fundamentals, the indices aim to represent each country's economic footprint and proxies for its ability to service debt.
- (44) The Merrill Lynch Global Government Bond Index I tracks the performance of investment grade sovereign debt publicly issued and denominated in the issuer's own domestic market and currency.
- (45) The Citi RAFI Sovereign Emerging Markets Local Currency Bond Index Series seeks to reflect exposure to the government securities of a universe of 14 emerging markets. By weighting components by their fundamentals, the indices aim to represent each country's economic footprint and proxies for its ability to service debt.
- (46) The JPMorgan GBI-EM Diversified Index seeks exposure to the local currency sovereign debt of over 15 countries in the emerging markets.

Source: All index returns are calculated using total return data from Bloomberg and FactSet. Returns for all single country strategies and Europe regional strategies are in local currency. All other returns are in USD.

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