FUNDAMENTALS

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"Many portfolios look like a truck with several baskets of eggs loaded on it. Clearly, investors' eggs are vulnerable to the truck tipping over."

Eggs Are Not Enough: The Truth About Diversification

We learn in finance theory that diversification simply means not putting all your eggs in one basket.

Simple as the idea is, most investors do not hold portfolios that are even close to being truly diversified. Two reasons make this sensible objective difficult to achieve. First, most investors are not disciplined enough to implement diversification. To illustrate my point, pause and check whether you are willing to reduce equities when the trailing 12-month return on stocks is 20+ percentage points higher than bonds?

Second, but not less importantly, most investors do not actually diversify their equity risk with their investment decisions; they are still exposed to one common significant shock. Returning to our initial definition, many portfolios look like a truck with several baskets of eggs loaded on it. Clearly, investors' eggs are vulnerable to the truck tipping over.

This issue of *Fundamentals* will show why it is so important to get your estimates of risk correct in asset allocation decisions.

Source of True Diversification

Many of my Chinese friends who are not in the finance field view having Apple, Facebook, and a few more hot stocks in their brokerage accounts as providing sufficient diversification. Luckily, like most Chinese people, they also love to own real estate and put huge amounts of money in savings accounts. So, to a degree, they are more diversified than they intend to be.

My more investment-sophisticated friends own a portfolio with multiple asset classes including equities, bonds, commodities, etc. And within each category, they diversify across geographical or economic regions. For example, they hold both U.S. Treasuries and Emerging Market Sovereign Bonds. They also believe they are adequately diversified. They are better diversified than my less sophisticated friends, but they are probably not as diversified as they want to be.

The truth is, static diversification across multiple asset classes is not sufficient. An adequately diversified portfolio should also be diversified over time and over different economic regimes. Yes, the tactical element in your allocation!

In standard finance applications, asset class volatilities and correlations are usually assumed to be constant over time for simplicity. For example, Harry Markowitz's mean-variance optimization requires that the asset class variance–covariance matrix is known and constant over the holding horizon. While this simplified assumption reduces the complexity of the models and their calculations, it could also lead to sub-optimal portfolios and risk management solutions. If equity market volatility is time-varying and is negatively correlated with equity market

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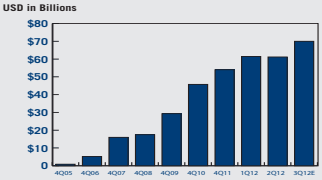
RAFI® Managed Assets*



**Includes RAFI® assets managed or sub-advised by Research Affiliates® or RAFI licensees.*

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returns, ignoring this counter-cyclicality could lead to excess allocation to stocks when forward-looking risk for stocks is high. Furthermore, if equity market volatility is positively correlated with the volatilities of other asset classes, ignoring this correlation would again lead to an overall overconcentration in risky assets.

Macro Factor Influence

To demonstrate that common macro factors indeed drive the movements in financial assets, **Table 1** illustrates volatilities for 16 asset classes in expansionary and recessionary environments over the period 1997–2012. As Table 1 shows, equities tend to experience a sharp spike in volatility when an economy is in a recessionary period compared to an expansionary period.[1] This sharp increase in equity market volatility often goes together with rising volatilities in other pro-cyclical asset classes such as commodities, high yield, and long credit.

The results in Table 1 suggest that shocks to equity valuation often spill over to other markets, and that liquidity-driven selling and the reduction in liquidity provision in the capital market are often systemic across various asset classes. This observation is confirmed by the correlation data. For this data set, the average of correlations across all 16 asset classes nearly doubles to 0.50 in recessionary stages from 0.28 in expansionary periods. Their correlations with the S&P 500 Index average 0.62 in economic downturns in contrast to 0.39 in expansions.

> *"The truth is, static diversification across multiple asset classes is not sufficient."*

The evidence presented illustrates two points: (1) the second moments (i.e., volatilities and correlations) of asset classes' returns change drastically during different business cycle phases; and (2) true diversification is harder to achieve in recessions than in expansions.

To address the cyclicality issue, many people introduce correlation timing techniques such as regime-switching models and recession forecasting models into the asset allocation process. We can illustrate the advantage of introducing the time-varying variance–covariance matrix vividly by using a forecasting model with 100% hindsight. If we can predict NBER recession dates with 100% precision, the optimal portfolio of the 16 asset classes will give us an annualized return of 10.96% and a volatility of 10.05%, versus a return of 10.37% and volatility of 12.6% for the portfolio utilizing the long-term average covariance for optimization.

Let's say we cannot achieve 100% accuracy on when the economic regime shifts. Even when our dates are three months earlier or later than the actual regime switching dates, the portfolio still provides a Sharpe ratio much higher than the static model. In fact, when the business cycle (here we use NBER cycle definition) forecast model predicts a bit earlier than the actual switching dates, the Sharpe ratio of the portfolio is slightly better than the optimal one with perfect precision.[2]

The picture in **Table 2** is pretty clear—once you get the second moments estimates right, your asset allocation practice can be a lot more effective!

Table 1. Volatilities of Asset Classes, March 1997–June 2012

	Overall	Expansion	Recession
Commodities	17.26%	13.16%	24.49%
Bank Loans	7.03%	4.14%	14.20%
High Yield	10.04%	6.43%	19.39%
TIPS	5.84%	4.95%	9.49%
Convertibles	13.89%	10.27%	16.91%
REITs	21.20%	13.53%	32.58%
Local Currency EM	8.02%	6.99%	10.13%
Small-Cap U.S. Equities	21.49%	18.32%	27.75%
Emerging Markets Equities	25.89%	21.98%	35.51%
Developed ex U.S. Equities	18.13%	15.33%	24.08%
Large-Cap U.S. Equities	16.49%	13.52%	20.79%
Emerging Markets Bonds	13.48%	14.23%	14.38%
Short-Term Bonds	1.52%	1.75%	1.96%
Long Credit	9.22%	7.81%	15.66%
Core Fixed Income	3.54%	4.64%	9.50%
Long Treasury	10.31%	9.57%	14.39%
Average Volatilities	12.71%	10.41%	18.20%
Average Corr across All	0.36	0.28	0.50
Average Corr with S&P500	0.48	0.39	0.62

Source: Research Affiliates, based on monthly data from Morningstar Encorr.

Is This Time Different?

Since the Global Financial Crisis, we have seen a shift in the cross-asset classes' correlations. Asset classes seem to be more correlated than they used to. The trailing 10-year average pair-wise correlations among the 16 asset classes have jumped to 0.44 today from the level of 0.28 prior to Lehman's debacle in September 2008. Not surprisingly, people are asking whether this shift is a permanent structure break or just a cyclical peak. We believe it is too early to tell. After three and a half years, the short- to medium-term correlations based on 1-year or 3-year time periods have come down, but the 5-year and 10-year numbers continue to drift higher (see **Figure 1**). So, is this time really different? Probably *not*.

Conclusion

Diversification remains one of the most important considerations as investors design their investment portfolios. Asset classes have distinct volatility, correlation, and risk premium characteristics in both recessionary and expansionary periods. Employing long-term historical relationships across asset classes could lead to substantial underperformance when regime shifts happen because volatilities for various risky asset classes tend to be low in equity bull markets and high in equity bear markets.

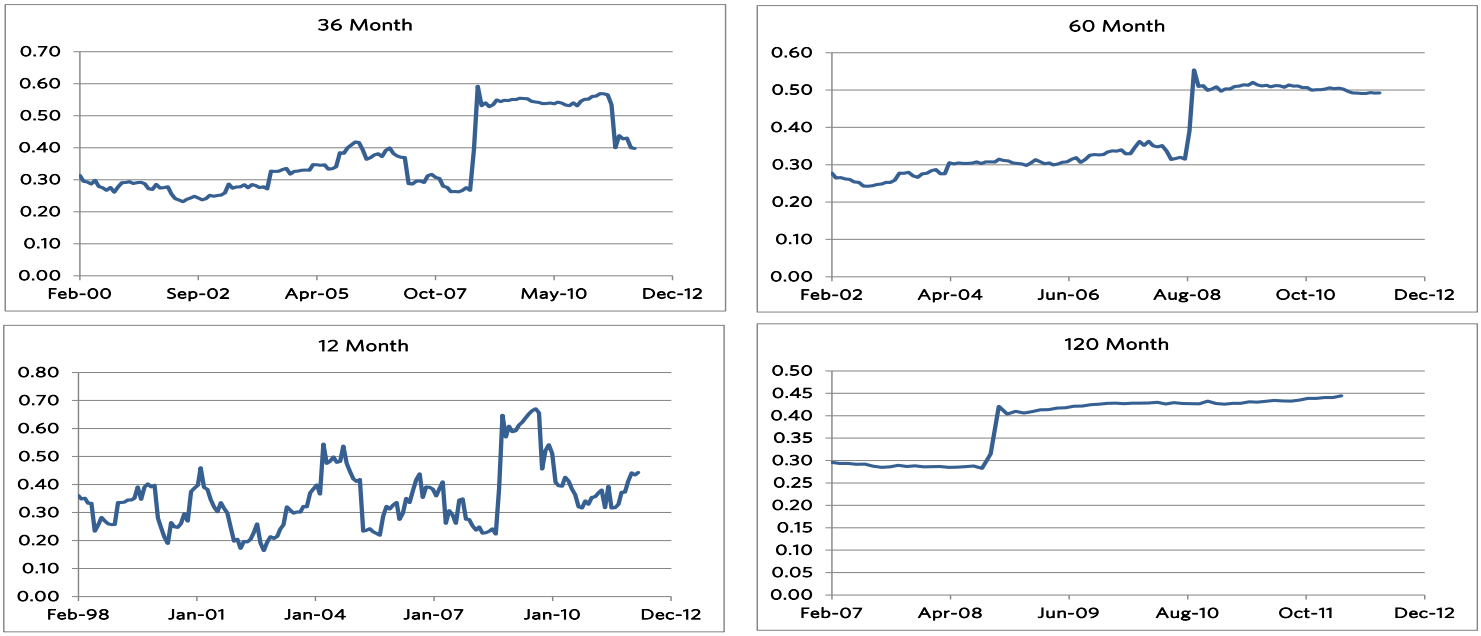
Investors should pay attention to how they achieve diversification in their portfolios. In recessionary periods, correlations between asset classes rise. Investors need to ensure they shift their asset allocation as regimes change. Capturing this time-varying characteristic is important for obtaining mean-variance portfolio optimization. When the road is smooth and straight, investors can carry as many baskets of eggs as they want to. But when it is bumpy and twisted, investors need to diversify the goods they are bringing to market—adding carrots, corn, and sweet potatoes, for example, in the event that their vehicle drives off the road.

Table 2. Performance of an Mean-Variance-Optimal Portfolio, March 1997–June 2012

	Return	Volatility	Sharpe Ratio
Full Period	10.37%	12.60%	0.61
Two Stage	10.96%	10.05%	0.82
Two Stage 3 Month Lag	10.59%	9.99%	0.79
Two Stage 3 Month Lead	11.15%	10.19%	0.83

Source: Research Affiliates, based on monthly data from Morningstar Encorr.

Figure 1. Average Correlations Across 16 Asset Classes



Source: Research Affiliates, based on monthly data from Morningstar Encorr.

Endnotes

1. We use the NBER recession dates to determine whether a period is Expansionary or Recessionary.
2. This result is not all that surprising given the well-known fact that NBER cycle definition tends to lag behind capital market movements.

Performance Update

FTSE RAFI® Equity Index Series*

TOTAL RETURN AS OF 9/30/12	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED 3 YEAR	ANNUALIZED 5 YEAR	ANNUALIZED 10 YEAR	10 YEAR VOLATILITY
FTSE RAFI® All World 3000[1]	TFRAW3	10.80%	18.33%	4.79%	-0.81%	11.73%	18.97%
MSCI All Country World[2]	GDUEACWF	13.39%	21.67%	7.78%	-1.54%	9.16%	17.06%
FTSE RAFI® Developed ex US 1000[3]	FRX1XTR	7.87%	10.90%	-0.91%	-4.48%	9.93%	20.49%
MSCI World ex US Large Cap[4]	MLCUWXUG	10.42%	14.37%	2.99%	-4.35%	9.16%	18.55%
FTSE RAFI® Developed ex US Mid Small[5]	TFRDXUSU	8.77%	8.50%	4.66%	0.35%	13.89%	19.07%
MSCI World ex US Small Cap[6]	GCUDWXUS	12.43%	13.27%	6.05%	-2.25%	11.97%	20.53%
FTSE RAFI® Emerging Markets[7]	TFREMU	10.43%	15.47%	5.02%	0.65%	23.40%	24.81%
MSCI Emerging Markets[8]	GDUEEGF	12.33%	17.33%	5.96%	-0.98%	17.37%	24.26%
FTSE RAFI® 1000[9]	FR10XTR	14.69%	28.91%	11.71%	2.32%	9.77%	17.66%
Russell 1000[10]	RU10INTR	16.28%	30.06%	13.27%	1.22%	8.35%	15.46%
S&P 500[11]	SPTR	16.44%	30.20%	13.20%	1.05%	8.01%	15.21%
FTSE RAFI® US 1500[12]	FR15USTR	14.38%	31.36%	12.39%	4.90%	13.22%	22.25%
Russell 2000[13]	RU20INTR	14.23%	31.91%	12.99%	2.21%	10.17%	20.34%
FTSE RAFI® Europe[14]	TFREUE	9.01%	13.24%	-3.04%	-6.27%	10.03%	23.27%
MSCI Europe[15]	GDDLE15	12.02%	18.13%	2.67%	-5.11%	9.36%	20.57%
FTSE RAFI® Australia[16]	FRAUSTR	16.09%	25.72%	7.86%	1.64%	16.14%	23.39%
S&P/ASX 200[17]	ASA51	14.06%	22.86%	7.57%	-0.30%	15.91%	23.82%
FTSE RAFI® Canada[18]	FRCANTR	9.52%	15.50%	7.89%	1.83%	16.65%	21.34%
S&P/TSX 60[19]	TX60AR	9.28%	14.98%	6.94%	-0.06%	15.31%	21.54%
FTSE RAFI® Japan[20]	FRJPNTR	-2.45%	-6.30%	-1.29%	-5.58%	5.35%	17.22%
MSCI Japan[21]	GDDLJN	2.43%	-1.51%	-0.40%	-6.36%	3.87%	16.83%
FTSE RAFI® UK[22]	FRGBRTR	11.36%	21.79%	5.58%	-3.88%	8.99%	20.15%
MSCI UK[23]	GDDLUK	10.67%	20.76%	7.88%	-3.22%	8.54%	18.27%

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

Russell Fundamental Index Series*

TOTAL RETURN AS OF 9/30/12	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED 3 YEAR	ANNUALIZED 5 YEAR	ANNUALIZED 10 YEAR	10 YEAR VOLATILITY
Russell Fundamental Global Index Large Company[24]	RUFGLTU	11.54%	20.42%	7.65%	0.27%	12.17%	17.54%
MSCI All Country World Large Cap[25]	MLCUAWOG	13.57%	22.06%	7.56%	-1.57%	8.58%	16.75%
Russell Fundamental Developed ex US Index Large Company[26]	RUFDXLTU	7.67%	11.16%	1.48%	-3.40%	11.35%	18.93%
MSCI World ex US Large Cap[27]	MLCUWXUG	10.30%	14.63%	2.70%	-4.43%	8.69%	18.43%
Russell Fundamental Developed ex US Index Small Company[28]	RUFDXSTU	11.04%	11.08%	5.45%	-0.04%	13.82%	18.56%
MSCI World ex US Small Cap[6]	GCUDWXUS	12.43%	13.27%	6.05%	-2.25%	11.97%	20.53%
Russell Fundamental Emerging Markets[29]	RUFGETRU	13.19%	18.82%	7.94%	2.15%	23.17%	24.58%
MSCI Emerging Markets[8]	GDUEEGF	12.33%	17.33%	5.96%	-0.98%	17.37%	24.26%
Russell Fundamental US Index Large Company[30]	RUFUSLTU	15.13%	30.02%	13.69%	3.09%	10.42%	16.10%
Russell 1000[10]	RU10INTR	16.28%	30.06%	13.27%	1.22%	8.35%	15.46%
S&P 500[11]	SPTR	16.44%	30.20%	13.20%	1.05%	8.01%	15.21%
Russell Fundamental US Index Small Company[31]	RUFUSSTU	14.05%	31.50%	14.61%	6.03%	13.55%	21.14%
Russell 2000[13]	RU20INTR	14.23%	31.91%	12.99%	2.21%	10.17%	20.34%
Russell Fundamental Europe[32]	RUFEUTE	10.53%	15.56%	1.62%	-4.19%	12.97%	22.29%
MSCI Europe[15]	GDDLE15	12.02%	18.13%	2.67%	-5.11%	9.36%	20.57%

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

Performance Update

Fixed Income/Alternatives

TOTAL RETURN AS OF 9/30/12	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED 3 YEAR	ANNUALIZED 5 YEAR	ANNUALIZED 10 YEAR	10 YEAR VOLATILITY
RAFI® Bonds Investment Grade Master[33]	—	8.26%	10.34%	9.09%	8.79%	6.68%	6.03%
ML Corporate Master[34]	C0A0	9.04%	10.98%	9.13%	7.87%	6.52%	6.20%
RAFI® Bonds High Yield Master[35]	—	12.43%	17.54%	12.89%	11.47%	12.19%	10.14%
ML Corporate Master II High Yield BB-B[36]	H0A4	11.26%	17.80%	12.03%	8.27%	9.68%	9.38%
RAFI® US Equity Long/Short[37]	—	-1.88%	-0.99%	-0.54%	2.14%	4.93%	11.69%
1-Month T-Bill[38]	GB1M	0.03%	0.04%	0.07%	0.51%	1.63%	0.50%
FTSE RAFI® Global ex US Real Estate[39]	FRXR	24.86%	26.87%	5.19%	—	—	—
FTSE EPRA/NAREIT Global ex US[40]	EGXU	27.69%	29.22%	8.51%	—	—	—
FTSE RAFI® US 100 Real Estate[41]	FRUR	19.91%	35.82%	20.94%	—	—	—
FTSE EPRA/NAREIT United States[42]	UNUS	15.04%	32.42%	19.99%	—	—	—
Citi RAFI Sovereign Developed Markets Bond Index Master[43]	CRFDMU	4.87%	5.40%	4.77%	5.96%	7.57%	7.85%
Merrill Lynch Global Governments Bond Index II[44]	W0G1	3.54%	3.63%	4.65%	6.60%	6.75%	7.13%
Citi RAFI Sovereign Emerging Markets Local Currency Bond Index Master[45]	CRFELMU	12.24%	7.42%	—	—	—	—
JPMorgan GBI-EM Global Diversified[46]	JGENVUUG	12.12%	12.66%	—	—	—	—

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 Large Cap 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 andweighted 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 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 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 U.S. 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 State. 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/NARIET Global Index and the EPRA/NAREIT North America Index and contains publicly quoted real estate companies that meet the EPRA Ground Rules. EPRA/NARIET 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 II 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.