FUNDAMENTALS

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"Investment theory may not have entered a full-blown crisis, but contrary ideas are in the air."

Searching for a New Investment Paradigm

Investment management is supposed to be built on brilliant minds' novel insights and innovative approaches—or so our training and traditions have led us to believe. We celebrate our best investors, such as Warren Buffett, Peter Lynch, and Bill Gross, and our best financial theories, such as modern portfolio theory (MPT) and the efficient markets hypothesis (EMH). Yet it seems a long time since we have seen true genius or radically new ideas; and, even more unsettling, recent literature suggests that investors of the future may be deprived of the kind of revolutionary thinking that energized the investment profession in the last half-century.

Does the apparent dearth of financial genius mean the investment industry is in crisis? Will the lack of new investment theories lead to mediocre performance? We don't think so. In fact, we believe that the time is ripe for a new synthesis and that, in the interim, progressive investment management firms will continue to explore the possibilities and improve the investment process.

The Role of Geniuses

We are accustomed to think of scientific and technological advances as the work of individual creative geniuses. Albert Einstein's theories of relativity are, of course, classic cases in pure science, and examples in engineering also come readily to mind. Thomas Edison's perfection of the incandescent light bulb is taken for granted today, but, when Nikola Tesla's development of alternating current generators made long-distance power transmission practical, lighting changed the world by extending the natural day.[1] The cultural, economic, and personal effects of these inventions are immeasurable. In Robert J. Gordon's (2000) view, the electric light and the electric motor constitute the first of five clusters of great inventions in the late 19th and early 20th centuries that have shaped modern life.

Likewise, the investment management industry has benefited tremendously from transformative ideas. Notably, MPT, EMH, and the capital asset pricing model (CAPM) were developed by financial geniuses—Markowitz, Sharpe, Miller, Fama, Treynor, and others—whose work in the 1960s and 1970s revolutionized investment theory. The conceptual framework they constructed and the equations they devised have equipped several generations of investment professionals to make sense of the markets, develop powerful analytical engines, estimate fair values under normal conditions, and vastly increase the range of available strategies and instruments for taking on and laying off risk.

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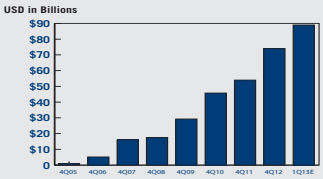

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But the role geniuses have played in the past is changing, according to Dr. Dean K. Simonton, an expert in the psychology of scientific creativity. Simonton (2013) distinguishes between creative scientists, who come forward with original and useful ideas, and scientific geniuses, who propose ideas that are original, useful, and *surprising*. Historically, some geniuses have established new specialties, and others have revolutionized existing fields; but, in Simonton's opinion, it is no longer possible for individual scientists—however gifted, accomplished, unconventional, and industrious they may be—either to found or to transform a discipline. He wrote:

> *Natural sciences have become so big, and the knowledge base so complex and specialized, that much of the cutting-edge work these days tends to emerge from large, well-funded collaborative teams involving many contributors.*

In this environment, scientists are merely "tidying up loose ends" rather than blazing new paths.[2] Indeed, Simonton suggests that in the improbable event a solitary genius were to get scientists' attention, it is unlikely they would endorse a costly shift to a new paradigm. Such a conceptual revolution generally takes place in a state of crisis resulting from the incapacity of the received paradigm to account for phenomena it can only call "anomalies." According to Thomas S. Kuhn (1996), "Failure of existing rules is the prelude to a search for new ones."[3]

In a cover story on the current pace of innovation, *The Economist* (2013) recently concluded that pessimistic appraisals may be overblown, and suggested that economic growth in the emerging world

> *"The human mind was made for arguing."*

might free millions of minds to "share the burden of knowledge." Tellingly, however, the article reports—and does not dispute—a conclusion reached by Pierre Azoulay and Benjamin Jones: "Though there are more people in research, they are doing less good." According to *The Economist*, Azoulay and Jones estimate that the average U.S. research and development (R&D) worker in 1950 added seven times more "total factor productivity" to economic growth than did an R&D worker in 2000. The article suggests that one element in this decline may be the vast amount of knowledge that individuals must acquire to reach the conceptual frontier of their discipline. I submit that Simonton's tidying up is another plausible factor.

The State of the Art

Although the institutional setting is quite different, the investment industry is, in some ways, tracking the natural sciences. There are cracks in the paradigmatic theory of capital markets. Facts do not support it.

In its semi-strong form, EMH represents a textbook world of frictionless markets in which publicly available information zips to rational, tax-exempt mean-variance optimizers who promptly grasp its implications for asset values in the context of their total portfolios. Low latency trading, which reacts instantaneously to momentary variances in mean-reverting processes, approaches this ideal state, at least within the limits of each model's perceptual field. Nonetheless, there is incontrovertible evidence that financial markets are in varying degrees inefficient, and it is widely acknowledged that, individually and collectively, flesh-and-blood investors are at best imperfectly rational.

Exceptional minds have responded ingeniously to important aspects of this situation. For example, alternative approaches to index investment recognize that securities are commonly mispriced, and smart beta strategies exploit persistent market patterns such as the low-volatility anomaly. These new approaches stand to transform the way investment professionals allocate assets. In addition, some of the best minds in the field are investigating a range of macro- and microeconomic factors in pursuit of a more robust construct than standard discount models to explain the equity risk premium. Behavioral finance offers increasingly rich accounts of the biases to which investors are prone; a deeper understanding of their cognitive styles and the stories they tell may lead theoreticians to rethink the industry's valuation models. It is also reasonable to anticipate significant contributions from emotional finance and neuroeconomics in the near future. In short, investment theory may not have entered a full-blown crisis, but fundamentally contrary ideas are in the air, and this is an exciting time for basic as well as applied research.

Will these alternative ideas be embraced? Or, as Simonton and Kuhn suggest, will they be resolutely ignored by established theorists and practitioners? Our experience tells us that many people are reluctant to explore, let alone endorse, new ideas. Some may feel they haven't enough time and energy to appraise the logic of and evidence for novel hypotheses. Others might thoroughly understand the rationale yet more or less consciously shrink

from the career risk that accompanies nonconformist thinking. These are comprehensible concerns. Practitioners face relentless demands at work and, often, in their personal lives, and, when economic growth is slow and unemployment high, the loss of a job can be catastrophic.

Nonetheless, investment professionals are ethically obligated to put their clients' interests before their own. Careerism does not trump fiduciary responsibility. Moreover, once published, new ways of thinking are subjected to intense scrutiny—by academics and leading practitioners alike—at a phenomenal pace. We are optimistic that people will become more comfortable with alternative approaches to investing as the new ideas, in their turn, become conventional.

With these notions in mind, what can firms do to foster, or at least recognize, financial genius and healthy innovation in the investment management industry?

Creativity and Group Dynamics

Fortunately, the options are within reach of most firms. Capital markets research requires neither funding on the scale of the CERN collider nor as many contributors as those who took part in the human genome project. Investment management firms organize relatively small workgroups or teams to conduct research in fairly well delineated topic areas such as asset classes. Large firms may additionally have more specialized research units exploring distinct geographical regions, economic sectors, or market segments. However they are organized, many firms' research efforts revolve around security analysis. Let us assume, however, that most investment organizations dedicate some resources and devote some time to thinking about theoretical issues such as identifying, investigating, and exploiting previously unrecognized or under-appreciated patterns of mispricing.

Academics and senior managers concerned with company culture, organizational design, and motivation have thought about the productivity of individuals and groups since the early days of the modern corporation more than a century ago. However, the challenges are all the greater in post-industrial, knowledge-based organizations, and they are especially acute when groups—even small groups—include the smartest and most independent people. Can investment research teams accommodate inventors and iconoclasts? Can truly original thinkers function as members of a team?

> *"At its best, small group research is an agonistic process, combative but never hostile."*

The familiar criticisms of assertedly nonjudgmental brainstorming call attention to the potential downside of group dynamics. No longer as fashionable as it once was, this technique for stimulating creativity in teams has not always proven effective because, despite the stated objective of generating new ideas in a safe haven, brainstorming naturally tends toward facile consensus-building. Some participants may fear they'll sound foolish, as original thinkers often do, and their suggestions will be quietly but nonetheless roundly dismissed. Others may keep their thoughts to themselves because they habitually defer to those who enjoy higher standing due to their hierarchical position, publishing record, or social status within the group. The exercise seems bound to end with fist-bumping after the team precipitously settles on the least disruptive rather than the most original idea.

Personalities differ, of course, but many creative people need encouragement, a quiet place, time alone, and, ironically, deadlines. And, far from being nonjudgmental, the workgroup should listen to their ideas critically—listen attentively, but find fault with their logic and evidence. Hugo Mercier and Dan Sperber (2011) do not see the confirmation bias[4] as a cognitive defect; they maintain instead that the human mind was made for arguing, and that reasoning itself is primarily a search for persuasive arguments in support of one's position. That's why we're so bad at criticizing our own ideas and so good at finding the weaknesses in others. Argumentative theory compellingly suggests that the proper function of the team is to *evaluate* alternative hypotheses and solutions. At its best, small group research is an agonistic process, combative but never hostile.

The reticent and deferential individuals who hold back in brainstorming sessions will not be reassured when the firm encourages their teammates to criticize their ideas. However, there are steps senior managers, notably including research directors, can take to establish and maintain a collegial atmosphere. It is most important to ensure that team members have what Mercier and Sperber call "a shared interest in the truth." In other words, the participants should be concerned, not with winning a debate, but with finding the most

promising answer, however outlandish it might sound at first. Moreover, a corporate culture and workgroup ethic that emphasizes interpersonal honesty, trust, and respect substantially improves the likelihood that all participants will openly share their opinions and offer constructive advice. Research directors and, in the best case, leadership coaches should freely guide participants who seek their advice, just as they should help chronic free riders and arrogant, sarcastic individuals understand that some other firm would probably prove more congenial.

The Way Ahead

In a recent talk at a Research Affiliates conference, Bradford Cornell proposed a series of simple economic principles modeled on fundamental physical laws such as the conservation of energy.[5] One of those principles is, "Growth in productivity over the long term is limited by the rate of technological innovation." Innovation that improves productivity is a necessary, and ultimately a limiting, condition for per capita GDP growth. But Cornell emphasized that it is not a sufficient condition; improvements in the standard of living further depend upon the social exploitation of new, more efficient technologies. Cornell was addressing a critical determinant of economic history with his customary rigor and attention to the data, but, simplified and expressed in more general terms, his insight also applies to investors and investment managers. We derive no advantage from better ways of doing things if we don't adopt them.

In our view, a new, principles-based investment theory, one that promises to work as well as CAPM did while accounting for recalcitrant facts about functioning capital markets, is in the offing. We don't know what form it will take—recall that genius is surprising—but we predict that it will emerge from the collective efforts of many gifted, accomplished, argumentative, sleep-deprived thinkers. In the interim, healthy small groups may succeed in discovering specific anomalies, hypothesizing about their causes, conditionally formulating restricted laws, vigorously criticizing them, and publishing their test results. This is not to suggest it's a good plan to leap a chasm in stages; it is merely to recognize the difference between tidying up and making real but admittedly incremental improvements in the professional practice of investment management. While the industry awaits a new synthesis, investors stand to profit from unexploited opportunities as well as the lower costs that may result from operational efficiencies. And they certainly benefit from transparency.

Endnotes

1. Edison violently opposed the spread of Tesla's technology. It is not an edifying story.
2. Simonton concedes, "A possible exception is theoretical physics, which is as yet unable to integrate gravity with the other three forces of nature."
3. In Kuhn's influential theory, the natural sciences are subject to sudden, comprehensive "revolutions" or "paradigm shifts," particularly when scientists who are not irrevocably committed to the prevailing theory can no longer disregard contradictory findings.
4. Daniel Kahnemann concisely explains the confirmation bias: "Contrary to the rules of philosophers of science, who advise testing hypotheses by trying to refute them, people (and scientists, quite often) seek data that are likely to be compatible with the beliefs they currently hold."
5. Bradford Cornell, "Six Easy Economic Pieces: A Lecture Honoring the Spirit of Richard P. Feynman." Delivered April 27th at the Research Affiliates 2013 Advisory Panel.

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Performance Update

FTSE RAFI® Equity Index Series*

TOTAL RETURN AS OF 4/30/13	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED 3 YEAR	ANNUALIZED 5 YEAR	ANNUALIZED 10 YEAR	10 YEAR VOLATILITY
FTSE RAFI® All World 3000[1]	TFRAW3	10.44%	18.60%	8.27%	3.19%	12.27%	18.65%
MSCI All Country World[2]	GDUEACWF	9.75%	15.69%	9.32%	2.09%	9.30%	16.58%
FTSE RAFI® Developed ex US 1000[3]	FRX1XTR	8.89%	18.53%	5.34%	-0.44%	10.81%	20.27%
MSCI World ex US Large Cap[4]	MLCUWXUG	9.70%	18.05%	7.41%	-0.43%	9.95%	18.21%
FTSE RAFI® Developed ex US Mid Small[5]	TFRDXUSU	9.82%	15.21%	7.89%	5.16%	14.60%	19.00%
MSCI World ex US Small Cap[6]	GCUDWXUS	12.45%	18.32%	9.44%	2.66%	12.94%	20.14%
FTSE RAFI® Emerging Markets[7]	TFREMU	-2.36%	1.22%	1.99%	0.75%	20.60%	24.47%
MSCI Emerging Markets[8]	GDUEEGF	-0.79%	4.34%	3.44%	-0.02%	16.50%	23.97%
FTSE RAFI® 1000[9]	FR10XTR	14.93%	22.52%	13.10%	7.80%	10.31%	17.19%
Russell 1000[10]	RU10INTR	12.97%	17.17%	12.91%	5.49%	8.32%	14.94%
S&P 500[11]	SPTR	12.74%	16.89%	12.80%	5.21%	7.88%	14.63%
FTSE RAFI® US 1500[12]	FR15USTR	11.88%	18.80%	10.67%	10.37%	13.79%	21.98%
Russell 2000[13]	RU20INTR	11.98%	17.69%	11.25%	7.27%	10.47%	19.95%
FTSE RAFI® Europe[14**]	TFREUE	6.31%	19.65%	4.56%	0.65%	8.22%	17.50%
MSCI Europe[15**]	GDDLE15	7.48%	19.31%	8.29%	1.86%	7.60%	14.44%
FTSE RAFI® Australia[16**]	FRAUSTR	16.67%	31.32%	9.61%	5.72%	11.04%	13.40%
S&P/ASX 200[17**]	ASA51	13.06%	23.66%	7.31%	3.09%	10.32%	13.42%
FTSE RAFI® Canada[18**]	FRCANTR	3.14%	6.63%	4.47%	3.88%	10.63%	13.52%
S&P/TSX 60[19**]	TX60AR	0.60%	4.81%	2.61%	-0.14%	9.24%	13.98%
FTSE RAFI® Japan[20**]	FRJPNTR	37.23%	47.26%	6.53%	-0.70%	7.00%	20.00%
MSCI Japan[21**]	GDDLJN	36.88%	49.02%	7.78%	-1.49%	5.92%	19.34%
FTSE RAFI® UK[22**]	FRGBRTR	11.30%	20.36%	8.94%	5.28%	9.70%	15.52%
MSCI UK[23**]	GDDLUK	10.34%	16.58%	8.93%	5.04%	8.87%	13.37%

*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 4/30/13	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	10.46%	18.12%	9.67%	4.29%	12.55%	17.13%
MSCI All Country World Large Cap[25]	MLCUAWOG	9.49%	15.45%	9.14%	1.86%	8.70%	16.25%
Russell Fundamental Developed ex US Index Large Company[26]	RUFDXLTU	9.07%	18.08%	5.96%	0.57%	12.07%	18.71%
MSCI World ex US Large Cap[27]	MLCUWXUG	9.58%	18.20%	7.25%	-0.64%	9.44%	18.07%
Russell Fundamental Developed ex US Index Small Company[28]	RUFDXSTU	12.93%	19.13%	9.65%	5.45%	14.91%	18.46%
MSCI World ex US Small Cap[6]	GCUDWXUS	10.49%	15.12%	8.52%	2.52%	12.88%	20.37%
Russell Fundamental Emerging Markets[29]	RUFGETRU	-1.93%	3.51%	4.60%	3.17%	20.92%	24.22%
MSCI Emerging Markets[8]	GDUEEGF	-0.79%	4.34%	3.44%	-0.02%	16.50%	23.97%
Russell Fundamental US Index Large Company[30]	RUFUSLTU	14.75%	21.35%	13.78%	8.03%	10.86%	15.60%
Russell 1000[10]	RU10INTR	12.97%	17.17%	12.91%	5.49%	8.32%	14.94%
S&P 500[11]	SPTR	12.74%	16.89%	12.80%	5.21%	7.88%	14.63%
Russell Fundamental US Index Small Company[31]	RUFUSSTU	12.89%	19.41%	12.27%	11.41%	14.34%	20.87%
Russell 2000[13]	RU20INTR	11.98%	17.69%	11.25%	7.27%	10.47%	19.95%
Russell Fundamental Europe[32**]	RUFEUTE	5.41%	17.55%	5.81%	2.55%	10.79%	16.26%
MSCI Europe[15**]	GDDLE15	6.93%	18.54%	7.90%	1.60%	7.62%	14.71%

*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 4/30/13	BLOOMBERG TICKER	YTD	12 MONTH	ANNUALIZED 3 YEAR	5 YEAR	10 YEAR	10 YEAR VOLATILITY
RAFI® Bonds US Investment Grade Master[33]	—	1.54%	7.13%	8.05%	8.38%	6.28%	5.97%
ML Corporate Master[34]	C0A0	1.75%	8.24%	8.14%	7.99%	6.03%	6.12%
RAFI® Bonds US High Yield Master[35]	—	3.92%	12.76%	11.19%	11.76%	10.17%	9.49%
ML Corporate Master II High Yield BB-B[36]	H0A4	4.24%	13.32%	10.74%	9.67%	8.71%	9.12%
RAFI® US Equity Long/Short[37]	—	5.53%	14.37%	0.81%	6.88%	6.01%	11.28%
1-Month T-Bill[38]	GB1M	0.01%	0.06%	0.08%	0.21%	1.56%	0.51%
FTSE RAFI® Global ex US Real Estate[39]	FRXR	13.38%	37.93%	13.73%	3.40%	—	—
FTSE EPRA/NAREIT Global ex US[40]	EGXU	11.82%	32.32%	14.07%	1.69%	—	—
FTSE RAFI® US 100 Real Estate[41]	FRUR	17.54%	26.20%	16.76%	9.76%	—	—
FTSE EPRA/NAREIT United States[42]	UNUS	15.29%	19.24%	16.96%	6.35%	—	—
Citi RAFI Sovereign Developed Markets Bond Index Master[43]	CRFDMU	0.64%	4.39%	6.09%	4.44%	6.60%	7.73%
Merrill Lynch Global Governments Bond Index II[44]	W0G1	-1.77%	-1.00%	4.57%	3.87%	5.43%	7.05%
Citi RAFI Sovereign Emerging Markets Local Currency Bond Index Master[45]	CRFELMU	4.05%	12.15%	—	—	—	—
JPMorgan GBI-EM Global Diversified[46]	JGENVUUG	3.31%	10.31%	—	—	—	—

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 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 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.