Industry Specific Alpha Series

Electrify Stock Returns in U.S. Utilities

Using SNL Energy Data to Generate Alpha

Authors

Frank Zhao
Quantamental Research
617-530-8107
fzhao@spglobal.com

Li Ma, CFA
Quantamental Research
312-233-7124
lma@spglobal.com

Acknowledgements
The authors would like to thank Nick Kapur, Curt Ophaug-Johansen, Lillian Federico and the Regulatory Research Associates team (Global Energy Group at S&P Global Market Intelligence) and CFRA's Equity Research Analysts, Christopher Muir and Stewart Glickman for their guidance and suggestions.

The U.S. utilities sector has historically been one of the best performing sectors in terms of risk-reward tradeoff with an annualized Sharpe Ratio[1] of 0.61, the second highest among all ten GICS[2] sectors since 1997[3]. The sector has performed especially well in the past several years[4] as the Federal Reserve and central banks around the world enacted accommodative monetary policies to spur growth. As global active investors flock to the U.S. utilities sector in search of yields and high risk-adjusted returns, we explore a number of utility-specific metrics from a unique database that is dedicated to the utilities sector – S&P Global Market Intelligence's SNL Energy – to ascertain whether investors could have historically made stock selection decisions within the sector to achieve excess returns. Our findings include:

- **Relative valuation metrics are the most effective in selecting utility stocks.** The "cheapest" companies based on utility-specific metrics *adjusted operating cash flow yield* and *tangible book to price* outperformed the benchmark by 3.96% and 3.65% per annum, respectively, with significance at the 1% level (Exhibit 10).

- **Rate case[5] determinations, which reflect the relative friendliness of state utility regulators, have an impact on future stock returns**. Utilities that win regulators' approval with the highest *allowed return on their rate base* outperformed the benchmark by an annualized 1.81% at the 5% significance level (Exhibit 12).

- **Utility-specific metrics outperformed their generic counterparts.** Over our testing period, the utility-specific value metric *adjusted operating cash flow yield* outperformed the generic one *EBITDA-to-enterprise value* by 1.27% per annum; *Allowed return on asset base* outperformed *ROA* by 3.34% per annum (Exhibit 16).

- **Investors favor utilities with high earnings quality, while punishing firms with poor operating margins.** A metric of accruals generated annualized long-only active return[6] of 2.17% with significance at the 5% level. Utilities with subpar recurring operating margin underperformed the market by an annualized 2.98%, also significant at the 5% level (Exhibit 10).

- **A strategy that combines four metrics[7] yielded an annualized long-only active return of 4.76% and an information ratio[8] that is at least 21.8% higher than that of the best standalone metric**, indicating the diversification benefits from using a multi-factor strategy framework for stock selection (Exhibit 14).

[1] Sharpe Ratio (SR) = (Strategy Return - Risk-Free Rate) / Standard Deviation (Strategy Return)
[2] GICS – Global Industry Classification Standard. Our sample period is before the addition of the 11th GICS sector.
[3] See Exhibit 1. See Lo's (2002) assumptions with respect to annualizing monthly Sharpe Ratios.
[4] Sector Returns by Year 2007 – 2016 from www.sectorspdr.com. See Reference section.
[5] A rate case is a regulatory process to set the price of a utility's products. See Section 2.5 for details.
[6] Long-only active return = equal-weighted top tertile of the stocks less equal-weighted return of the universe.
[7] Adjusted OCF / Market-Cap; Tangible Book-to-Price; Adjusted Accruals; Allowed Return on Rate Base
[8] Information ratio is the annualized ratio of long-only active return divided standard deviation of those returns.

1. Introduction

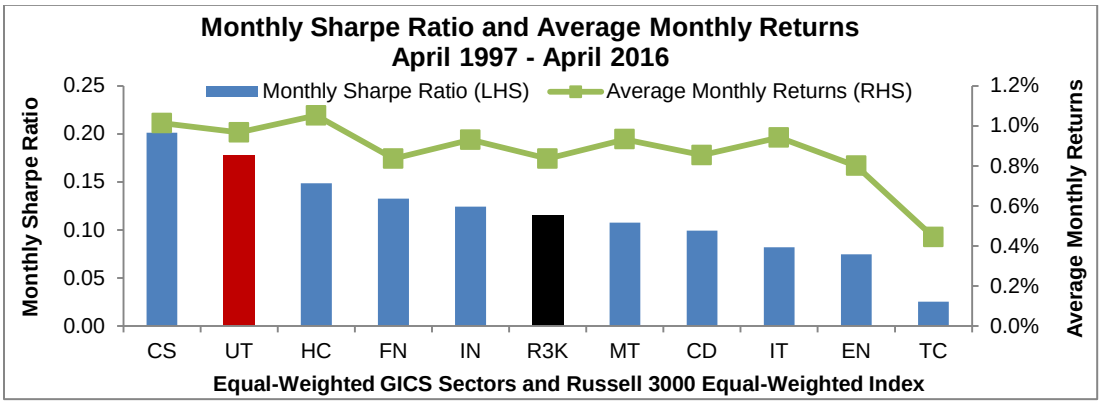
In 1831, Michael Faraday discovered "electromagnetic induction", the process of wire electrification via a magnet's movement. Fifty years later in 1882, Thomas Edison opened the first full-scale power plant in New York City. Edison's electric generator was a bigger version of Faraday's basic experiment. Today, power plants are even larger and computerized, with an entire industry – electric utilities – built around them.

In this report, we explore various stock selection signals in the U.S. utilities sector, including electric-, gas-, multi-utilities and independent power producers (IPP), using data sets from S&P Global Market Intelligence's Energy database. As a heavily regulated sector, utilities present a unique challenge for investors trying to pick the outperforming stocks, thanks to their (naturally) monopolistic business model, region-specific regulations and the lowest intra-sector return dispersions among the GICS sectors. Additionally, over the past 20 years, the sector achieved the second highest risk-adjusted returns among all GICS sectors with a monthly Sharpe Ratio of 0.18, 55% higher than Russell 3000 Index's (Exhibit 1).

Exhibit 1: Average Monthly Equal-Weighted Returns and Sharpe Ratios
Ten GICS Sectors and Russell 3000: April 1997 – April 2016

CS = consumer staples; UT = utilities; HC = health care; FN = financials; IN = industrials; MT = materials; R3K = Russell 3000 Index; CD = consumer discretionary; EN = energy; IT = Information technology; TC = telecom

	CS	UT	HC	FN	IN	R3K	MT	CD	IT	EN	TC
Monthly Sharpe Ratio	0.201	0.177	0.149	0.133	0.124	0.115	0.108	0.099	0.082	0.075	0.025
Average Monthly Returns	1.01%	0.97%	1.05%	0.84%	0.93%	0.84%	0.93%	0.85%	0.94%	0.80%	0.44%
Average Monthly Returns Volatility	9.94%	6.26%	13.91%	8.40%	10.98%	12.22%	10.70%	11.88%	14.10%	11.14%	13.78%



Source: S&P Global Market Intelligence Quantamental Research. All returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016

2. Utilities Basics

This section provides a brief overview of investor-owned electric- and multi-utilities companies[9], which represent about 90% of the overall utilities sector's market capitalization in the U.S[10]. We also discuss how the nuances specific to this sector, reviewed below, are reflected in the construction of the signals discussed in Section 3 and in the Appendix.

[9] This research focuses on investor-owned utilities, i.e. for-profit entities owned by shareholders. For a description of different types of utilities in the U.S, see Appendix A.1.
[10] Within the Russell 3000 Index as of March 31, 2016. See Appendix A.9.

2.1 Electricity Supply Chain

The structure of electricity delivery can be categorized into three sequential steps: generation, transmission, and distribution, all of which are linked by substations (i.e., connectors).

Exhibit 2: Electricity Supply Chain

Source: U.S. Department of Energy July 2015

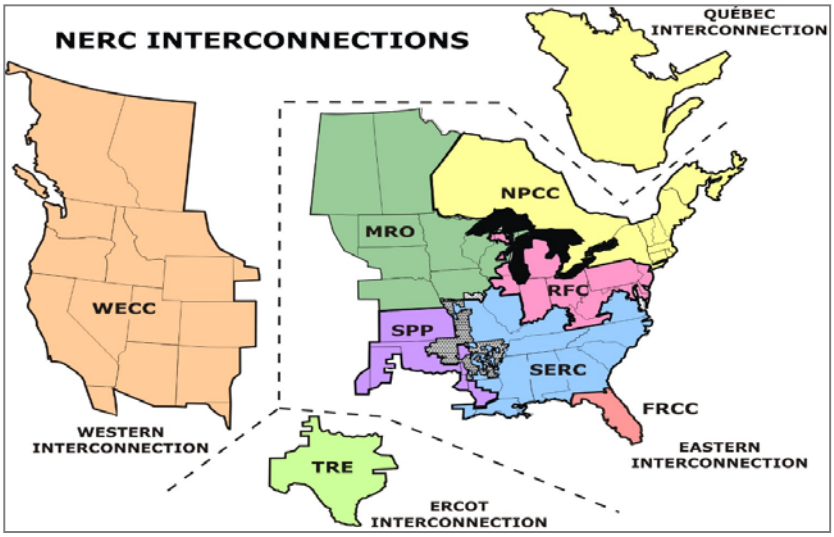
2.1.1 Generation

Generation is the process where electricity is produced from power plants. Generally, most power plants are thermally driven by steam. In thermal generation, a fuel (e.g., coal) heats water to create pressurized steam that moves the turbine blades, which in turn move a large magnet around a coil of wire to produce electricity. Generators at power plants are fuel-type specific. Primary fuel types include coal, natural gas, nuclear, crude oil and renewable[11].

2.1.2 Transmission and Distribution

Transmission and distribution networks are commonly known as 'the grid'. North America's bulk power system is comprised of four sub-grids, three in the U.S. (Exhibit 3). The four regions operate independently with the exception of a few conversion links in between. Two of the three U.S. interconnections houses one NERC[12] region, with the exception of Eastern Interconnection that houses six. NERC's role is to ensure the reliability of the North American bulk power system.

Exhibit 3: North America Transmission and Distribution Grid



Source: U.S. Department of Energy July 2015

[11] See Appendix A.2 for details on electricity generating mechanism for different fuel types.
[12] North American Electric Reliability Corporation

2.2 Generation Fuel Mix

Historically, fossil fuel and nuclear power plants have been the predominate sources of power generation in the U.S. In calendar year 2015, coal and natural gas were used in approximately 66% of the total net generation[13] in the U.S. and nuclear power plants accounted for another 21% (Exhibit 4). In Exhibit 5, we show the share of electricity net generation by fuel type in the U.S. since 1994. Due to the distinct economics of different fuel types, we constructed intra-fuel plant-level metrics before aggregating them to the publicly-traded parent level.

Exhibit 4: Net Generation by Fuel Type – Calendar Year 2015

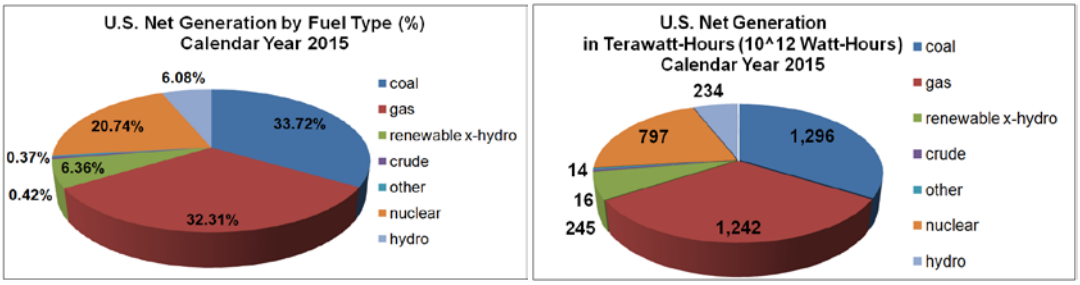
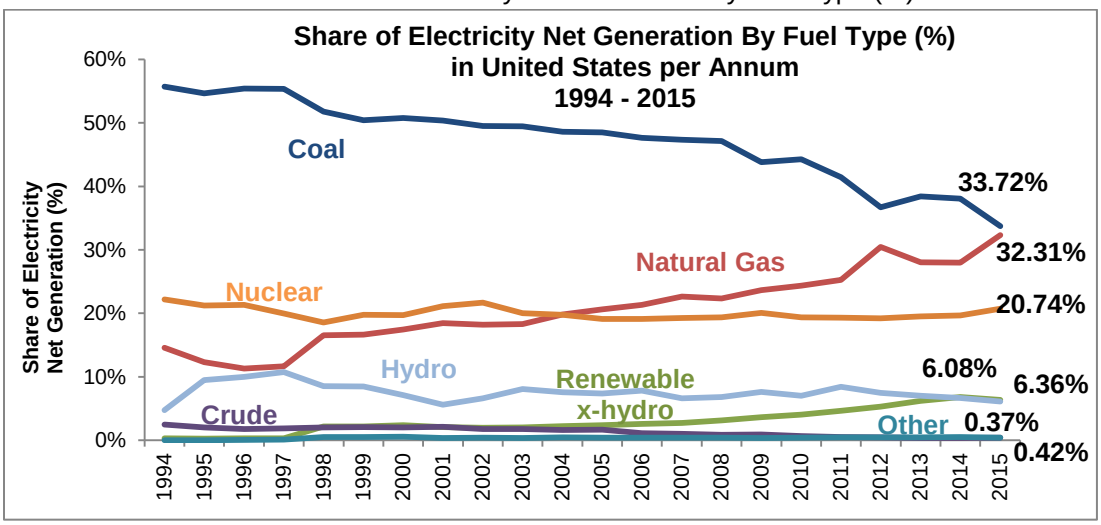


Exhibit 5: Share of Electricity Net Generation by Fuel Type (%)



Source: S&P Global Market Intelligence Quantamental Research and SNL Energy Power-Plant Level data set. Data as at 10/15/2016

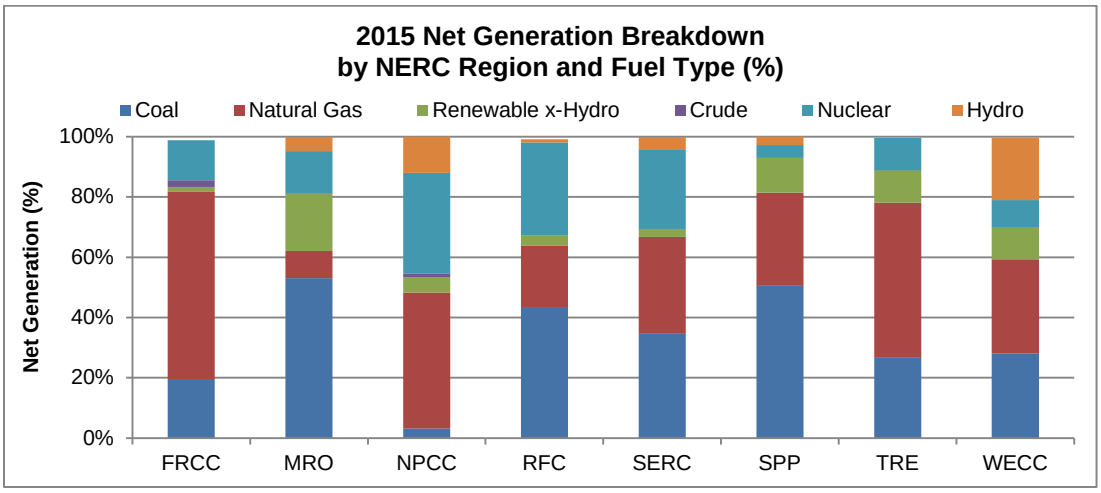
2.3. NERC Regions

In each of the eight NERC regions, electricity is produced with a different mixture of power plants (Exhibit 6). For example, West of Rockies' (WECC) generation is from a more balanced combination of coal, natural gas, renewable and nuclear plants, whereas Florida's (FRCC) generation is predominately from natural gas. Given the diversity among the regions, we constructed intraregional plant metrics before aggregating them to the publicly-traded parent level.

[13] Net generation = total generation less the electricity that is consumed by the power plant itself to carry out operations and is measured in watt-hours

Exhibit 6: 2015 Net Generation by NERC Region and Fuel Type (%)

FRCC = Florida; MRO = States ND, SD, NE, MN; NPCC = Northeast; RFC = Rust Belt + IN, PA; SERC = Southeast x-Florida; SPP = OK,LA; TRE = Texas; WECC = West of the Rockies

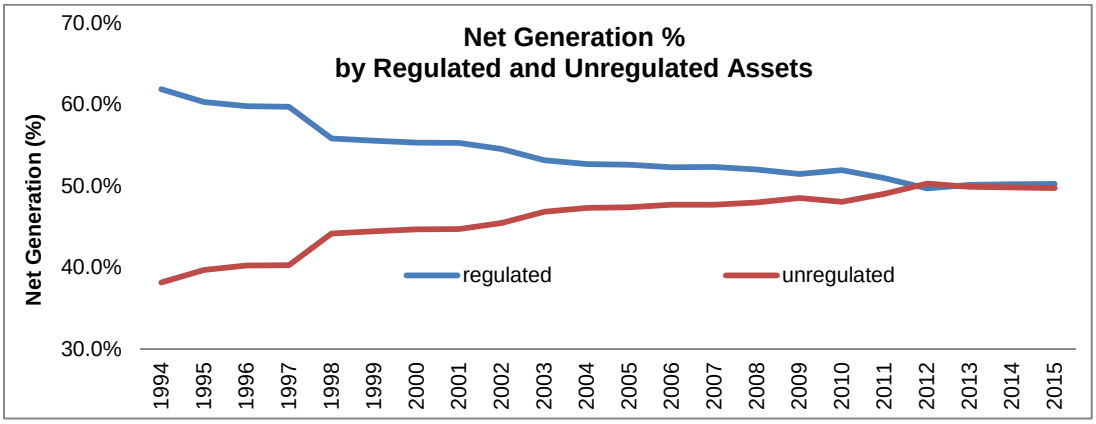


Source: S&P Global Market Intelligence Quantamental Research and SNL Energy Data as at 10/15/2016

2.4 Regulated and Wholesale Markets

Utilities sell and deliver electricity in two main ways: the vertically integrated model and the wholesale model. In the vertically integrated model, a utility operates the entire supply chain of generation, transmission and distribution. Historically, these are heavily regulated utilities that are scrutinized by regulators at the federal and state level. The price that the customer pays in this model is based on costs to serve over a period of time and is determined through the rate case process (see Section 2.5). Starting in the 1990s, the generation step in the electricity supply chain became unregulated in a dozen or so states, in hopes that deregulation would increase price competition and efficiency. However, some states have pulled back following California's electricity crisis of 2001[14]. Exhibit 7 shows the breakdown of regulated and unregulated net generation over time.

Exhibit 7: Net Generation by Regulated and Unregulated Power Plants in the U.S
1994 - 2015



Source: S&P Global Market Intelligence Quantamental Research; SNL Energy Data as at 10/15/2016

[14] Congress of the United States Congressional Budget Office: Causes and Lessons of the California Electricity Crisis. September 2001.

2.5 Ratemaking Process

Due to the monopolistic nature of regulated utilities, a cost-of-service methodology is used to set the price for a utility's products. When a regulated utility finds itself in need of a revenue increase for supplying electricity, it must come before its state commission and file a "rate case"[15] where the utility asks for additional revenue that is based on operating costs, depreciation expenses, tax, and a reasonable return for its shareholders.

After a series of testimonies and negotiations, the state commission would issue a verdict on the allowed revenue increase, allowed return on rate base (%), incurred expenses and capital investments. Once a so-called "revenue requirement" is established, it is then backed into an aggregate sale price per watt-hour that is comprised of a fixed monthly charge and an additional usage-based charge per watt-hour to determine each customer's monthly bill.

Revenue Requirement = ROR (Rate Base) + Operating Expenses + Depreciation + Taxes

where ROR = A reasonable cost of capital or rate of return;
Rate Base = Company's net utility assets deemed necessary to provide services to ratepayers

It is important to note that while state commissions are required to provide utilities investors with an opportunity to earn a reasonable return, utilities are by no means guaranteed to earn that authorized return. Utilities that are continually subject to "regulatory lag", whose authorized revenue requirement does not reflect the full value of the investments that are currently being used to provide service, they may never be able to earn their authorized returns.

3. Signal Formulation, Description and Empirical Results

Based on the unique characteristics of the utilities sector just discussed, we constructed a number of signals by taking into account the sector's nuances and assessed their relationship with future utility returns. We grouped our signals into two main categories: Fundamental and Atypical (Exhibit 8).

Exhibit 8: Categories of Utilities Signals

Fundamental Signals	
Relative Value	Identifies undervalued stocks based on certain fundamental characteristics.
Quality	Assesses the persistence of a utility's income and cash flow as well as the efficient use of its assets.
Growth	Examines the actual and estimated growth in operations, investments and assets.
Atypical Signals	
Regulatory Environment	Impact of the regulatory process on a utility's profitability.
Power Plant Operations	Information aggregated from the operation data at the power plant level.

[15] Regulatory Research Associates: The Rate Case Process: A Conduit to Enlightenment. September 2016.

3.1 Fundamental Signals

Exhibit 9 provides a description of some of the most interesting fundamental signals[16]. The last column shows the order in which the signal is ranked: "D" for descending and "A" for ascending.

Exhibit 9: Factor Description – Fundamental Signals

	Signal	Description	Order
Relative Value	Recurring EBITDA / EV	Earnings before interest expenses, income taxes, depreciation and amortization attributable to ongoing operations, to enterprise value[17].	D
	Adjusted OCF / Market Cap	Cash flow from operating activities, before the effect of changes in allowances for funds used for construction (AFUDC) and changes in working capital, to market cap.	D
	Tangible BP	Tangible book value per share to close price.	D
	Net Generation / Market Cap	Net generation in megawatt-hours (Mwh) as reported in FERC Form 1 to market cap.	D
Quality	Adjusted Accruals	Difference between net income and adjusted operating cash flow, scaled by net income. A higher ratio indicates lower earnings quality and less likely to persist into the future.	A
	Recurring Operating Margin	Operating income divided by revenue ratio that is attributable to ongoing operations. Higher profit margin reflects higher operating efficiency.	D
Growth	Electric and Gas Revenue Growth	This is an SNL-calculated metric, calculated as year-over-year % change in electric revenue for power companies and gas revenue for gas companies. Raw values are z-scored within the power and the gas industry, respectively, and then ranked across the entire universe. Higher growth reflects stronger revenue trends and is expected to be associated with positive stock performance.	D
	CapEx FY1 90D Revision	90-day % change in analyst estimates of 1-year forward capital expenditures. Literature finds firms that substantially increase capital investments subsequently underperform their benchmark index[18].	A

Exhibit 10 reports results for the fundamental signals. It contains the following information[19]:

- Start date: the date back-tests commenced for a given signal.
- Average count: average count of stocks with data over the back-test horizon.
- Annualized equal-weighted long-only active return, information ratio and hit rate[20].

[16] See Appendix A.3.1 through A.5.2 for a complete list of the fundamental signals we have examined.
[17] Enterprise value is the sum of market capitalization and all non-common equity, debt, and mezzanine at book value, less cash and cash equivalents at book value.
[18] Titman et al. (2003), Capital Investments and Stock Returns.
[19] See Section 6 for details on the back-test methodology.
[20] **Hit rate** is the count of monthly positive long-only active returns divided by the total number of months.

- Annualized equal-weighted long-short returns and average 1-month information coefficients (IC)[21].

Relative Value signals as a group were the most effective in selecting utility stocks over our back-test period. The utility-specific metric *Adjusted OCF / Market Cap*, the cash flow based valuation signal that adjusts for change in AFUDC (allowances for funds used for construction) and working capital, generated the highest long-only active return (3.96%), long-short return (8.87%) and monthly IC (0.056), all significant at the 1% level.

AFUDC is an income credit representing construction financing costs and it is unique to the utilities sector. If state regulators do not include a utility's construction work in progress (CWIP) in the calculation of its rate base (upon which the utility is allowed to earn an actual return), the utility records an AFUDC on its income statement[22]. The adjusted OCF thereby removes the impact of state regulation around the recognition of CWIP on cash flow since some states allow utilities to include CWIP in the rate bases while others do not.

Exhibit 10: Fundamental Signals 1-Month Performance Summary
Russell 3000 (Utilities): Start Date – March 2016

	Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Relative Value	Adjusted OCF / Market Cap	3/31/1997	73	3.96%***	0.733	57.6%**	8.87%***	0.056***
	Tangible BP	3/31/1997	67	3.65%***	0.595	58.1%**	7.70%***	0.037***
	Recurring EBITDA / EV	3/31/1997	73	3.07%**	0.539	55.5%	7.23%***	0.041***
	Net Generation / Market Cap	5/31/1993	56	2.62%*	0.406	56.0%**	4.91%***	0.029***
Quality	Adjusted Accruals	3/31/1997	70	2.17%**	0.456	55.9%*	4.20%***	0.030***
	Recurring Operating Margin	3/31/1997	74	0.67%	0.138	48.9%	3.66%**	0.010
Growth	CapEx FY1 90D Revision	8/31/2008	59	3.01%	0.586	52.2%	5.79%**	0.036**
	Electric and Gas Revenue Growth	3/31/1998	64	-2.40%**	-0.498	43.8%*	-3.67%**	-0.011

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07//31/2016.

Adjusted accruals is the best performing signal that assesses a utility's earnings quality, with an annualized long-only active return of 2.17% (significant at the 5% level), annualized long-short return of 4.20% and monthly IC of 0.03 (both significant at the 1% level). Companies with a low level of accruals have more persistent earnings as the cash components in the earnings are less prone to management's discretion. As a result, investors favor these utilities over those with a higher level of accruals.

[21] **Long-short return** is the equal-weighted return of the top one-third of stocks (based on a signal) minus the equal-weighted return of the bottom one-third of stocks, based on the same signal; **IC** is the rank correlation of the signal at time t to forward stock return at time t+1.
[22] S&P Global: Industry Surveys – Electric Utilities. August 2015.

Recurring operating margin also shows some efficacy in selecting utility stocks, with an annualized long-short return of 3.66%, significant at the 5% level. In un-tabulated results, we found that the third of utilities with the lowest recurring operating margin underperform the utilities sector benchmark by 2.98% per annum on average, significant at the 5% level. The fact suggests that companies with subpar profit margin attributable to ongoing operations are heavily punished by the market. Conversely, the results for other Quality signals indicate that a portfolio of efficiently-run utilities did not outperform its utilities sector benchmark over the back-test period (Appendix A.4.2). One plausible explanation is that the outcomes of rate cases pre-determine much of a utility's costs and profits, and therefore utilities don't have incentives to squeeze out more profits via efficient cost controls.

One surprising finding was that utilities with high growth in electric and gas revenues underperformed their low-growth counterparts by 3.67% per annum, significant at the 5% level. A possible reason is that utility investors might shy away from high-growth utilities because of the uncertainty in cost recovery associated with the rapid expansion, as regulatory processes that utilities go through can drag on for years.

3.2 Atypical Signals

Signals in this category utilize data from several non-conventional sources[23]. Regulatory Environment signals are based on rate case outcomes and assess how friendly the regulators are in states where utilities operate. Power Plant Operation signals use information that are aggregated from the plant level with generation capabilities. Due to the fact that power plants have very distinct economics depending on where (which NERC region(s)) they operate and what fuel-type they use, we compare a plant's operating or cost metric against other plants' metrics that operate in the same NERC region and use the same fuel-type before aggregating the adjusted plant level metrics to the publicly-traded parents.

Exhibit 11: Factor Description – Atypical Signals

	Signal	Description	Order
Regulatory Environment	Allowed Return on Rate Base	Allowed rate of return directly affects a utility's ability to earn an adequate return for its investors. Subsidiaries' allowed ROR are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies that are allowed a higher return have an opportunity to provide their investors with a higher return on their invested capital.	D
	Allowed ROE	Allowed rate of return directly affects a utility's ability to earn an adequate return for its investors. Subsidiaries' allowed ROE are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies that are allowed a higher ROE have an opportunity to provide the equity investors with a higher return.	D

[23] See Appendix A.6.1 through A.7.2 for a complete list of the atypical signals we have examined.

Exhibit 11: Factor Description – Atypical Signals (Continued)

	Signal	Description	Order
Power Plant Operations	Total Operating & Maintenance (O&M) Cost per Mwh	Total O&M costs per Mwh where different fuel types at power plants are compared amongst each other within a NERC region before aggregating up to the publicly-traded parent	A
	Dispersion of the Past 36-Month Net Generation	The volatility of monthly net generation in megawatt-hours in the past 3 years	A
	Power Plant Efficiency	How efficiently a power plant converts a fuel into electricity[24] at power plants are compared amongst each other within a NERC region before aggregating up to the publicly-traded parent	D

Exhibit 12 shows the performance of select atypical signals. The two allowed rate of return signals – *allowed return on rate base and allowed ROE* – had statistically significant long-only active returns, long-short returns and monthly ICs over the past 33 years[25]. Investors historically seem to favor utilities that are provided an opportunity to earn a relatively higher return on the invested capital, even though they are not guaranteed such a return.

Power Plant Operation signals do not show efficacy in our back-test. We attribute this lack of strength to the fact that most of the utilities in our universe that have plant-level data have regulated generating assets. Since cost is passed along to the end consumers and profit is a pre-determined function of the cost, profitability, cost, and efficiency metrics that are meaningful in other industries are less so in this sector.

Exhibit 12: Regulatory Environment Signals 1-Month Performance Summary
Russell 3000 (Utilities): Start Date – March 2016

	Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Regulatory Environment	Allowed Return on Rate Base	12/31/1983	89	1.81%**	0.412	53.6%	2.27%**	0.011*
	Allowed ROE	12/31/1983	89	1.23%*	0.305	51.8%	1.93%**	0.010*
Power Plant Operations	Total Operating & Maintenance Cost per Mwh	03/31/1995	45	0.36%	0.075	49.2%	0.51%	-0.005
	Dispersion of the Past 36-Month Net Generation	06/30/2001	45	0.27%	0.049	48.6%	-1.06%	-0.003
	Power Plant Efficiency	03/31/1995	44	-1.01%	-0.173	46.0%	-1.65%	0.002

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level. Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

[24] Efficiency of a power plant = 3412 Btu / heat rate; e.g., heat rate for plant X is 10,500 Btu then its efficiency is 33%; higher the ratio the more efficient a power plant is.
[25] While the Regulatory Environment signals shown in Exhibit 12 are constructed using a 3-year look-back window, we also tested the same factors using 1-year look-back and the results are similar.

4. Combining the Signals in a Multi-Factor Framework

In this section we explore a multi-factor strategy based on several of the more promising factors in selecting utility stocks to see whether a composite signal can outperform standalone ones. Our factor selection process was driven by performance, correlation and coverage. We selected two relative value signals, one quality and one regulatory environment signal and equal-weighted the ranks of the four signals to come up with the composite score. We required a stock to have data on at least three signals before the score is calculated. Stocks are then ranked based on this composite and grouped into tertiles (3 groups), as we did with the single factors. The rank correlations among the four signals are displayed in Exhibit 13 and the performance of the composite along with the underlying signals are shown in Exhibit 14.

Exhibit 13: Factor Rank Correlation Matrix (March 1997 – March 2016)

Signal Category	Signals	Adjusted OCF / Market Cap	Tangible BP	Adjusted Accruals	Allowed Return on Rate Base
Relative Value	Adjusted OCF / Market Cap	1.00	0.36 ***	0.53 ***	-0.04
Relative Value	Tangible BP		1.00	0.09	-0.11 *
Quality	Adjusted Accruals			1.00	0.00
Regulatory Environment	Allowed Return on Rate Base				1.00

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

The composite historically yielded better long-only active return and information ratio. Its annualized long-only active return (long-only IR) was 4.76% (0.893), 80 basis points (22%) higher than that of Adjusted OCF / Market Cap, the best performing single factor. This suggests that investors can achieve superior economic and risk-adjusted performance by capturing diversification benefits both on the alpha and the risk side.

Exhibit 14: Performance Summary - Russell 3000 (Utilities)
March 1997 – March 2016

Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Equal-Weighted Composite	3/31/1997	72	4.76%***	0.893	59.8%***	8.74%***	0.054***
Adjusted OCF / Market Cap	3/31/1997	73	3.96%***	0.733	57.6%**	8.87%***	0.056***
Tangible BP	3/31/1997	67	3.65%***	0.595	58.1%**	7.70%***	0.037***
Adjusted Accruals	3/31/1997	70	2.17%**	0.456	55.9%*	4.20%***	0.030***
Allowed Return on Rate Base	3/31/1997	76	2.37%**	0.463	53.2%	3.30%**	0.015*

*** statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as of 07/31/2016.

5. Industry-Specific Signals vs. Generic Signals

How does the performance of these industry-specific signals compare to commonly used generic stock selection signals? We examined several signals based on generic fundamental and pricing data (See Appendix A.8 for factor descriptions) and show their performance in Exhibit 15.

Exhibit 15: Generic Factors 1-Month Performance Summary
Russell 3000 (Utilities): Start Date – March 2016

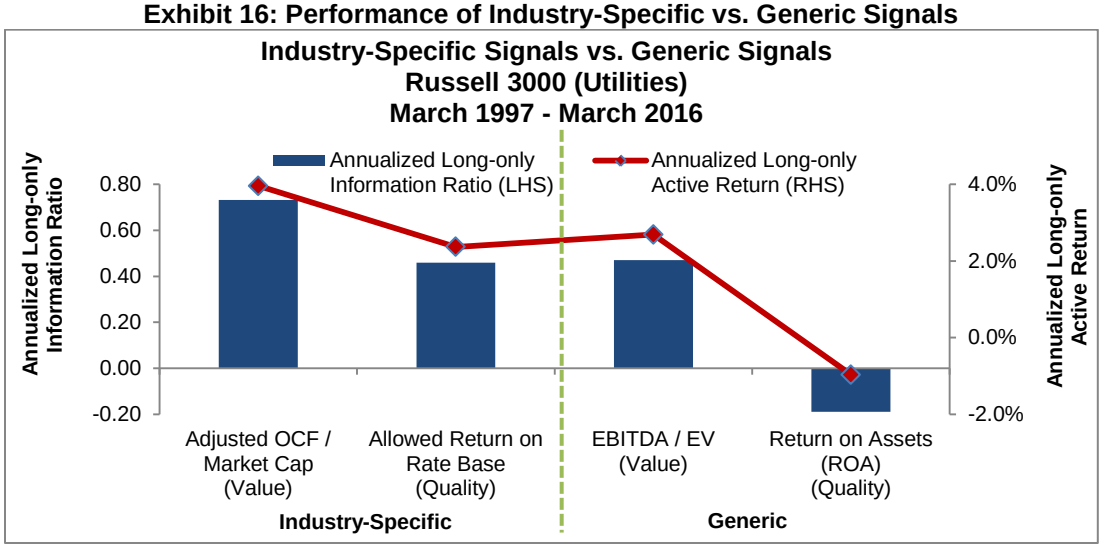
Signal Category	Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Relative Valuation	EBITDA / EV	3/31/1997	74	2.69%**	0.470	55.0%	5.80%***	0.028***
Relative Valuation	Dividend Yield	3/31/1997	73	2.56%*	0.397	52.8%	5.33%**	0.023*
Price Momentum	12-Month Momentum	3/31/1997	93	1.72%	0.242	54.1%	2.96%	0.010
Quality	Net Profit Margin	3/31/1997	74	-0.34%	-0.066	49.3%	0.73%	-0.014
Quality	ROA	3/31/1997	74	-0.97%	-0.189	45.9%	-0.21%	-0.024**
Growth	Net Income Growth	3/31/1998	73	-3.19%***	-0.674	45.6%	-4.57%**	-0.023**

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016

Like the results from the industry-specific signals, generic value metrics as a group performed well in differentiating utility stocks' returns over the back-test period, while other categories either delivered weak performance or behaved counterintuitively.

Although the generic value factors showed strong performance during our sample period, the performance of the utility-specific value signal *adjusted OCF/market-cap* in terms of long-only IR and long-only active return trumped the performance of both of the generic value signals by a wide margin (Exhibit 16). When we look at the utility-specific signal *allowed return on rate base* as a quality proxy, its performance trumped the performance of the generic quality signal *ROA*. In fact, ROA's performance is perverse in this sample period (Exhibit 16). Our results suggest that considering the nuances of the utilities sector, investors using industry-specific factors could have historically achieved better performance than using their generic counterparts.

Exhibit 16: Performance of Industry-Specific vs. Generic Signals

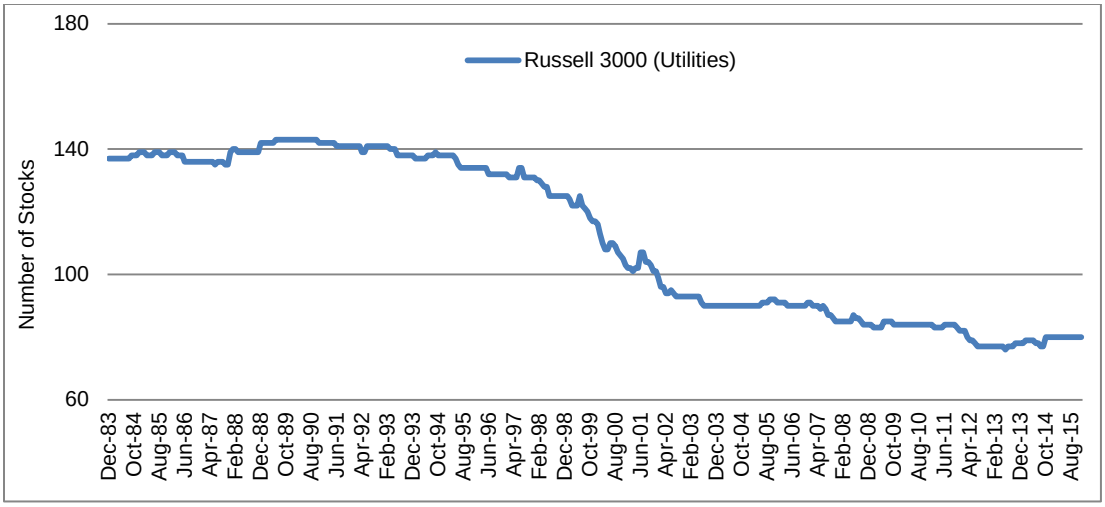


*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level. Source: S&P Global Market Intelligence Quantamental Research. All returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016

6. Universe and Back-test Methodology

The universe is based on the investor-owned electric-, gas-, multi-utilities and IPPs that are covered within S&P Global Market Intelligence's Energy index (SNL Energy Index). We require that the firms be a member of Russell 3000 Index to address survivorship bias and inadequate liquidity. The average monthly firm count is 112 between 1983 and 2015, and 80 at the end of 2015 (Exhibit 17).

Exhibit 17: Time Series Firm Count for Russell 3000 (Utilities) Universe



Source: S&P Global Market Intelligence Quantamental Research and SNL Energy. Data as at 10/31/2016

To assess the predictive efficacy of a signal in stock selection, we rank all the stocks in the universe by the signal at the end of each month and group the stocks into tertiles (three groups by rank). We rank stocks in an ascending or a descending order such that the top

(bottom) tertile is expected to outperform (underperform) the utilities market benchmark. The tertile portfolios are rebalanced monthly at month end. We measure the equal-weighted returns of the top and bottom tertiles, and compare them to the equal-weighted returns of all stocks in S&P Global Market Intelligence's Energy index (SNL Energy Index) that are also in the Russell 3000 Index. We also examine the return difference between the top and bottom tertile, as well as the correlations between stock ranks and forward 1-month returns (monthly IC). We trim and winsorize at the 99.5% level.

7. Data

The data for this research was sourced from S&P Global Market Intelligence's Energy database. As of November 2016, SNL's Energy database covers plant level, financial, regulatory and operational data on more than 3,200 electric utilities, 200+ natural gas companies and 9,000+ coal, natural gas, nuclear and renewable plants in North America.

On the plant level, the database provides annual and monthly whole-plant-level metrics including net generation, cost (e.g., fuel, O&M), emissions, and much more. Monthly data points are more limited but we apply a shorter-time lag of 3 months, whereas the annual filings are much more comprehensive but we apply a significant filing lag of 12 months.

One of the unique offerings of S&P Global Market Intelligence's Energy database is Regulatory Research Associates (RRA), which provides expert analysis on regulatory issues affecting power and gas utilities within the 50 states and the District of Columbia in the U.S., including a comparative risk assessment for each jurisdiction covered. The rate case data used in this research is based on the information and analytics provided by RRA, mapped from the subsidiaries that file the rate cases to the holding company level.

In addition to the plant-level and company-level data, S&P Global Market Intelligence's Energy database also covers commodities and energy market pricing data such as ISO data (day-ahead, hour-ahead and hourly real-time settlement prices) and CME futures (electricity, natural gas, coal, uranium and petroleum).

8. Conclusion

The utilities sector has a distinct industry structure and business model. We believe it is important that active investors consider the nuances in accounting practices, the impact of regulations and the implications of different fuel types and operating regions when evaluating the relative attractiveness of utility stocks. In this report, we examined a variety of signals that could potentially help investors make stock selection decisions in the utilities sector, using unique data sets from S&P Global Market Intelligence's Energy database. Our results show firms that are cheaper on a valuation basis outperformed during our test period. A portfolio of firms that operate in states with more "friendly" regulators, using allowed return on rate base and equity as proxies, also outperformed its benchmark. Our results also indicate that utility-specific metrics have historically outperformed their generic counterparts. Finally, utility-specific value, quality and regulatory environment signals have low pair-wise rank correlations, and a composite signal that includes metrics from each of these categories has historically yielded superior results than any of the underlying single factors.

References

A Brief Primer on Variable vs. Fixed costs
http://grist.org/article/the-economics-of-power-plant-construction/

Basic Economics of Power Generation, Transmission and Distribution
https://www.e-education.psu.edu/eme801/node/530

Causes and Lessons of the California Electricity Crisis
https://www.cbo.gov/sites/default/files/107th-congress-2001-2002/reports/californiaenergy.pdf

Electric Energy Economics
http://holbert.faculty.asu.edu/eee463/ElectricEnergyEconomics.pdf

Lo, Andrew W., The Statistics of Sharpe Ratios
Financial Analysts Journal, July/August 2002, Vol. 58, No. 4: 36-52.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=377260

Sheridan Titman, K. C. John Wei, Feixue Xie, 'Capital Investments and Stock Returns' - The Journal of Financial and Quantitative Analysis, Vol. 39, No. 4 (Dec., 2004), pp. 677 -700

Regulatory Research Associates: The Rate Case Process: A Conduit to Enlightenment. September 2016

S&P Global: Industry Surveys – Electric Utilities. August 2015

S&P Global: Industry Surveys – Gas Utilities. January 2016

United States Electricity Industry Primer 2015
http://www.energy.gov/sites/prod/files/2015/12/f28/united-states-electricity-industry-primer.pdf

U.S. Energy Information Administration
https://www.eia.gov/

Appendix

A.1: Utility Ownership Types

- *Investor-Owned Utilities (IOUs)*: for-profit entities owned by shareholders. Their generations, transmission, and power sales are regulated by government agencies such as FERC and their distribution system and retail sales are regulated by the states they operate in. Our empirical results focus on these since they are publically traded
- *Public Power Utilities ('Munis')*: non-for-profit utilities owned by cities and counties
- *Cooperatives (Co-Ops)*: non-for-profit entities owned by their members; traditionally they operate in rural areas
- *Federal Power Programs*: government affiliated utilities that generally serve other utilities (mostly to Munis). One example is Tennessee Valley Authority (TVA)
- *Independent Power Producers (IPP)*: non-utility generators that are privately-owned businesses that own and operate their own generation assets and sell power to other utilities or directly to end users.

Source: U.S. Department of Energy

A.2: Electricity Generating Mechanism for Different Fuel Types

Fuel Type	**Electricity Generating Mechanism**
Coal	Coal is burned in a boiler to turn water into steam. Under high pressure, the steam turns the blades of a turbine that spins a generator.
Natural Gas	Natural gas ignites compressed air, and the resulting combustion spins the turbine blades to produce electricity.
Nuclear	Steam is produced by the controlled splitting of uranium atoms in a process known as nuclear fission.
Renewable	Hydro, wind, solar, biomass etc are in this category. The turbine blades are moved by harness the kinetic energy of the various renewable.
Crude	Crude is burned in a boiler to turn water into steam. Under high pressure, the steam turns the blades of a turbine that spins a generator.

Source: S&P Global Market Intelligence Quantamental Research, SNL Energy, Edison Electric Institute

A.3.1 Fundamental Category - Relative Value Signal Descriptions

	Signal	Description	Order
Relative Value	Recurring Revenue / EV	The ratio of revenue attributable to ongoing operations to enterprise value.	D
	Energy Operating Revenue / EV	Energy Operating Revenue is all revenues from providing regulated and non-regulated electricity, gas, or other utility products and services, and all revenues derived from the extraction, refinement and sale of natural resources. This factor is the ratio of Energy Operating Revenue to enterprise value.	D
	Recurring EBITDA / EV	The ratio of earnings before interest expenses, income taxes, depreciation and amortization attributable to ongoing operations to enterprise value.	D
	Recurring EBIT / EV	The ratio of earnings before interest and taxes attributable to ongoing operations to enterprise value.	D
	Adjusted OCF / Market Cap	The ratio of cash flow from operating activities, before the effect of changes in allowances for funds used for construction and changes in working capital, to market cap.	D
	Tangible BP	The ratio of tangible book value per share to close price where tangible book value does not include intangible items such as goodwill.	D
	Output / EV	For power companies, this factor is the ratio of electricity sold in megawatt-hours to enterprise value. For gas companies, this factor is the ratio of gas throughput in million cubic feet to enterprise value. Raw values are z-scored within the power and gas industries respectively and then ranked across the entire universe.	D
	Net Generation / Market Cap	The ratio of net generation in megawatt-hours as reported in FERC Form 1 to market cap.	D
	EP FY1	The ratio of 1-year forward consensus EPS to close price.	D
	EP FY2	The ratio of 2-year forward consensus EPS to close price.	D

A.3.2 Fundamental Category - Relative Value Signals 1-Month Performance Summary Russell 3000 (Utilities): Start Date – March 2016

Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Adjusted OCF / Market Cap	3/31/1997	73	3.96%***	0.733	57.6%**	8.87%***	0.056***
Tangible BP	3/31/1997	67	3.65%***	0.595	58.1%**	7.70%***	0.037***
Recurring EBIT / EV	3/31/1997	73	3.10%**	0.560	53.3%	6.67%***	0.032***
Recurring EBITDA / EV	3/31/1997	73	3.07%**	0.539	55.5%	7.23%***	0.041***
EP FY2	1/31/2005	71	2.62%**	0.594	56.3%	5.55%**	0.047***
Net Generation / Market Cap	5/31/1993	56	2.62%*	0.406	56.0%**	4.91%***	0.029***
EP FY1	1/31/2005	72	2.30%*	0.533	56.3%	5.75%**	0.037**
Output / EV	3/31/1997	63	1.43%	0.280	51.5%	2.03%	0.001
Recurring Revenue / EV	3/31/1997	73	1.12%	0.220	56.8%**	3.53%*	0.021**
Energy Operating Revenue / EV	3/31/1997	74	1.06%	0.211	56.8%**	3.72%**	0.021**

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

A.4.1 Fundamental Category – Quality Signal Descriptions

	Signal	Description	Order
Quality	Earnings Quality		
	Adjusted Accruals	Difference between Net Income and Adjusted Operating Cash Flow, scaled by Net Income. Adjusted Operating Cash Flow is cash flow from operating activities before working capital changes and allowance for construction funds. A higher ratio indicates lower earnings quality and persistence.	A
	Net Regulatory Assets / Total Assets	The difference between regulatory assets and regulatory liabilities, scaled by total assets. Regulatory assets are created when companies are allowed to defer certain costs that are probable of recovery in future periods (such as costs related to storm damage and clean air expenditure). Regulatory liabilities represent deferred credits (such as obligations to refund previously collected revenue). High level of net regulatory assets hurt the quality of earnings.	A
	Industrial Revenue / Retail Revenue	Industrial customers are the most profitable group for utilities. A higher percentage of revenue coming from this group should be associated with better performance.	D
	Operating Efficiency		
	Recurring Operating Margin	Operating income attributable to ongoing operations divided by revenue attributable to ongoing operations. Higher profit margin reflects higher operating efficiency.	D
	Total Revenue / Avg Employees	SNL-calculated metric. Higher value indicators higher productivity per employee.	D
	Adjusted OCF / CapEx	SNL-calculated metric. Adjusted operating cash flow is cash flow from operating activities before working capital changes and allowance for construction funds. A higher ratio suggests the company is more efficient in generating cash flow from its capital expenditure.	D
	Customer Service Expenses per Customer	Total customer service and information expenses as reported in FERC Form 1 divided by the number of customers. Higher expenses per customer indicate lower operating efficiency.	A
	Weighted Average Price	Average price of electricity or natural gas per unit sold, weighted by operating revenue from the sale of electricity and natural gas. A higher price extracted from the customers translates to higher revenue for a utility.	D
	% Energy Loss	Energy loss in megawatt-hours as a percentage of net generation, as reported in FERC Form 1. A lower percentage indicates higher efficiency in generating energy.	A
	% Net PP&E in Service	Net property, plant and equipment in service as a percentage of total net PP&E. If a company has a high percentage of PP&E idle, it is not using its assets efficiently.	D
	Liquidity and Solvency		
	Credit Lines Drawn / Available	SNL-calculated metric. It measures revolving credit lines drawn down as a percent of revolving credit lines available. A lower ratio means the company is less constrained in liquidity.	A
	Pre-tax Interest Coverage Excluding AFUDC	SNL-calculated metric. Higher coverage ratio indicates a lower probability of default.	D
	Pension Plan Assets Actual Return	Utilities often have defined benefit plans and a low return on pension plan assets could be a hidden debt to the company.	D

A.4.2 Fundamental Category – Quality Signals 1-Month Performance Summary
Russell 3000 (Utilities): Start Date – March 2016

Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Earnings Quality							
Adjusted Accruals	3/31/1997	70	2.17%**	0.456	55.9%*	4.20%***	0.030***
Net Regulatory Assets / Total Assets	3/31/2005	52	1.86%	0.452	52.6%	0.79%	-0.004
Industrial Revenue / Retail Revenue	3/31/1997	44	0.96%	0.149	52.8%	0.76%	-0.004
Operating Efficiency							
Recurring Operating Margin	3/31/1997	74	0.67%	0.138	48.9%	3.66%**	0.010
Adjusted OCF / CapEx	3/31/1997	73	0.53%	0.105	52.4%	2.79%	0.010
Weighted Average Price	5/31/1993	64	0.28%	0.044	49.1%	0.32%	0.007
% Net PP&E in Service	3/31/1997	73	0.09%	0.020	52.8%	0.11%	0.004
% Energy Loss	5/31/1993	60	-0.23%	-0.045	46.9%	0.89%	-0.001
Customer Service Expenses per Customer	5/31/1997	51	-0.59%	-0.103	45.8%	-0.45%	-0.005
Total Revenue / Avg Employees	3/31/1998	68	-1.17%	-0.219	49.3%	-0.68%	0.003
Liquidity and Solvency							
Pension Plan Assets Actual Return	3/31/2002	57	0.72%	0.147	46.2%	2.55%*	-0.003
Credit Lines Drawn / Available	3/31/1997	64	0.14%	0.028	49.8%	-0.55%	-0.010
Pre-tax Interest Coverage Excluding AFUDC	3/31/1997	71	-1.14%	-0.233	45.4%	-3.14%*	-0.024**

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

A.5.1 Fundamental Category – Growth Signal Descriptions

	Signal	Description	Order
Growth	Recurring Revenue Growth	Year-over-year % change in revenue attributable to ongoing operations. Higher growth reflects strong revenue trend and is expected to be associated with positive stock performance.	D
	Electric and Gas Revenue Growth	This is an SNL-calculated metric, calculated as year-over-year % change in electric revenue for power companies and gas revenue for gas companies. Raw values are z-scored within the power and gas industries respectively and then ranked across the entire universe. Higher growth reflects strong revenue trend and is expected to be associated with positive stock performance.	D
	Net Generation Growth	Year-over-year % change in net generation as reported in FERC Form 1.	D
	Output Growth	Year-over-year % change in electricity sold for power companies and gas throughput for gas companies. Raw values are z-scored within the power and gas industries respectively and then ranked across the entire universe.	D
	Customer Growth	Year-over-year % change in the number of customers.	D
	Total Utility Plant Growth	Asset growth anomaly suggests fast growth in assets is negatively correlated with future stock returns. This factor is calculated as year-over-year % change in utility plants, including construction work in progress, as reported in FERC Form 1.	A
	Infrastructure Growth	Asset growth anomaly suggests fast growth in assets is negatively correlated with future stock returns. This factor is calculated as year-over-year % change in electric lines in miles for power companies and gas mains in miles for gas companies. Raw values are z-scored within the power and gas industries respectively and then ranked across the entire universe.	A
	CapEx FY1 90D Revision	90-day % change in 1-year forward capital expenditure estimates. Literature finds firms that substantially increase capital investments subsequently achieve negative benchmark-adjusted returns.	A

A.5.2 Fundamental Category – Growth Signals 1-Month Performance Summary
Russell 3000 (Utilities): Start Date – March 2016

Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
CapEx FY1 90D Revision	8/31/2008	59	3.01%	0.586	52.2%	5.79%**	0.036**
Customer Growth	3/31/1998	67	0.40%	0.077	51.2%	0.67%	-0.002
Total Utility Plant Growth	5/31/1994	66	-0.16%	-0.032	51.3%	0.03%	0.000
Net Generation Growth	5/31/1994	59	-0.36%	-0.068	44.1%*	0.16%	-0.009
Output Growth	3/31/1998	62	-0.78%	-0.165	45.6%	-2.59%*	-0.011
Infrastructure Growth	3/31/2005	55	-1.58%	-0.312	46.6%	-2.80%	-0.008
Recurring Revenue Growth	3/31/1998	73	-1.24%	-0.245	46.1%	-0.88%	-0.005
Electric and Gas Revenue Growth	3/31/1998	64	-2.40%**	-0.498	43.8%*	-3.67%**	-0.011

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

A.6.1 Atypical Category – Regulatory Environment Signal Descriptions

	Signal	Description	Order
Regulatory Environment	RRA Ranking	This ranking reflects RRA's assessment of the probable level and quality of the earnings to be realized by the state's utilities as a result of regulatory, legislative, and court actions. Subsidiaries' rankings are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies whose subsidiaries operate in states with a better ranking face more friendly regulatory environment and are expected to outperform.	A
	RRA Ranking YoY Chg	Year-on-year change in RRA Ranking.	A
	Allowed Return on Rate Base	Allowed rate of return directly affects a utility's ability to earn an adequate return for its investors. Subsidiaries' allowed ROR are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies that are allowed a higher return have an opportunity to provide their investors with a higher return on their invested capital.	D
	Allowed ROE	Allowed rate of return directly affects a utility's ability to earn an adequate return for its investors. Subsidiaries' allowed ROE are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies that are allowed a higher ROE have an opportunity to provide the equity investors with a higher return.	D
	Allowed Rate Change %	Allowed rate change gives a utility's an opportunity to increase the revenue in order to cover its costs and earn an adequate return for its investors. The allowed rate change as a percentage of revenue at the subsidiaries are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies that are allowed a larger rate increase face more friendly regulatory environment and are expected to outperform.	D
	Rate Case Duration	This signal measures the number of days between a company's request date of a rate case and the date when the rate case is approved by authority. Longer duration means more uncertainty and a more significant “regulatory lag” for the utility. Subsidiaries' rate case decision durations are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies that wait shorter for a rate case decision face more friendly regulatory environment and are expected to outperform.	A
	Test Year Timing	Regulators use test year to determine appropriate operating expenses. Fully forecasted test years are considered more favorable because the parameters used to set rates can more accurately reflect actual conditions in the rate-effective period. On the other hand, fully historical test years are less favorable. The number of days between test year end and rate case decision date at the subsidiaries are rolled up to the parent company by taking the average across the rate cases over the past 3 years. Companies that are allowed to use future test year face more friendly regulatory environment and are expected to outperform.	D

A.6.2 Atypical Category – Regulatory Environment Signals 1-Month Performance Summary Russell 3000 (Utilities): Start Date – March 2016

Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Allowed Return on Rate Base	12/31/1983	89	1.81%**	0.412	53.6%	2.27%**	0.011*
Allowed ROE	12/31/1983	89	1.23%*	0.305	51.8%	1.93%**	0.010*
RRA Ranking	12/31/1983	89	1.03%	0.237	52.0%	0.96%	0.001
Rate Case Duration	12/31/1983	90	0.99%	0.238	51.3%	1.04%	0.003
Test Year Timing	12/31/1983	90	0.54%	0.120	52.0%	1.27%	0.010*
RRA Ranking YoY Chg	12/31/1983	88	0.35%	0.049	53.3%	1.29%	0.003
Allowed Rate Change %	12/31/1983	87	0.28%	0.060	46.7%	0.64%	0.002

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

A.7.1 Atypical Category – Power Plant Fundamentals Descriptions

	Signal	Description	Order
Power Plant Operations	Fuel- and Region-Relative		
	average fuel cost per megawatt-hour	Average $ fuel cost per megawatt-hour where different fuel types at power plants are compared amongst each other within a NERC region before aggregating back up to the ultimate parent	A
	total operating & maintenance cost per megawatt-hour	Total operating & maintenance $ per megawatt-hour where different fuel type sat power plants are compared amongst each other within a NERC region before aggregating back up to the ultimate parent	A
	capacity factor %	capacity factor in % where different fuel types at power plants are compared amongst each other within a NERC region before aggregating back up to the ultimate parent	D
	plant electricity conversion efficiency	converting heat rate into electricity where different fuel types at power plants are compared amongst each other within a NERC region before aggregating back up to the ultimate parent	D
	Profitability		
	profit per megawatt-hour	Revenue derived from selling electricity less cost incurred to selling electricity divide by total net generation	D
	Geographical Diversity		
	utilities with net generation with most geographical diversity	utilities that operate in most region sub-region combination where the metric = # of NERC region * 100 + # of sub-NERC region * 10 + # of states	D
	Volatility of Plant-Level Metrics		
	dispersion the past 36 months of fuel and region-relative average cost per megawatt-hour	the volatility of average fuel $ per megawatt-hour in the past 3 years	A
	dispersion the past 36 of monthly net generation	the volatility of monthly net generation in the past 3 years	A
	Net Generation from Unregulated Plant-Level Assets		
	net generation by regulated assets / total net generation	net generation from regulated assets as % of total net generation	D
	fuel-relative variable cost per megawatt-hour for utilities with unregulated assets	fuel-relative variable cost per megawatt-hour for utilities where at least 25% of its net generation is from unregulated assets	A

A.7.2 Atypical Category – Power Plant Operations Signals 1-Month Performance Summary Russell 3000 (Utilities): Start Date – March 2016

Signal	Start Date	Average Count	Annualized Long-only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
fuel- and region-relative average fuel cost per megawatt-hour	3/31/1995	42	0.45%	0.096	48.8%	0.36%	-0.008
fuel- and region-relative total operating & maintenance cost per megawatt-hour	3/31/1995	45	0.36%	0.075	49.2%	0.51%	-0.005
fuel- and region-relative capacity factor %	3/31/1995	45	-0.52%	-0.094	49.6%	-0.27%	-0.009
fuel- and region-relative plant electricity conversion efficiency	3/31/1995	44	-1.01%	-0.173	46.0%	-1.65%	0.002
Profitability							
profit per megawatt-hour	3/31/1997	43	-0.33%	-0.060	46.0%	-0.43%	0.002
Geographical Diversity							
utilities with net generation with most geographical diversity	3/31/1995	46	0.03%	0.005	50.8%	0.44%	-0.004
Volatility of plant-level metrics							
dispersion the past 36 months of fuel and region-relative average cost per megawatt-hour	4/30/2011	47	1.77%	0.386	45.6%	-1.25%	-0.015
dispersion the past 36 of monthly net generation	6/30/2001	45	0.27%	0.049	48.6%	-1.06%	-0.003
Net Generation from Unregulated Assets							
net generation by regulated assets / total net generation	3/31/1995	44	-0.59%	-0.091	47.6%	-0.73%	0.002
fuel-relative variable cost per megawatt-hour for utilities with unregulated assets	3/31/1995	14	-1.79%	-0.212	47.6%	-3.00%	-0.025

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

A.8.1 Factor Description – Generic Factors

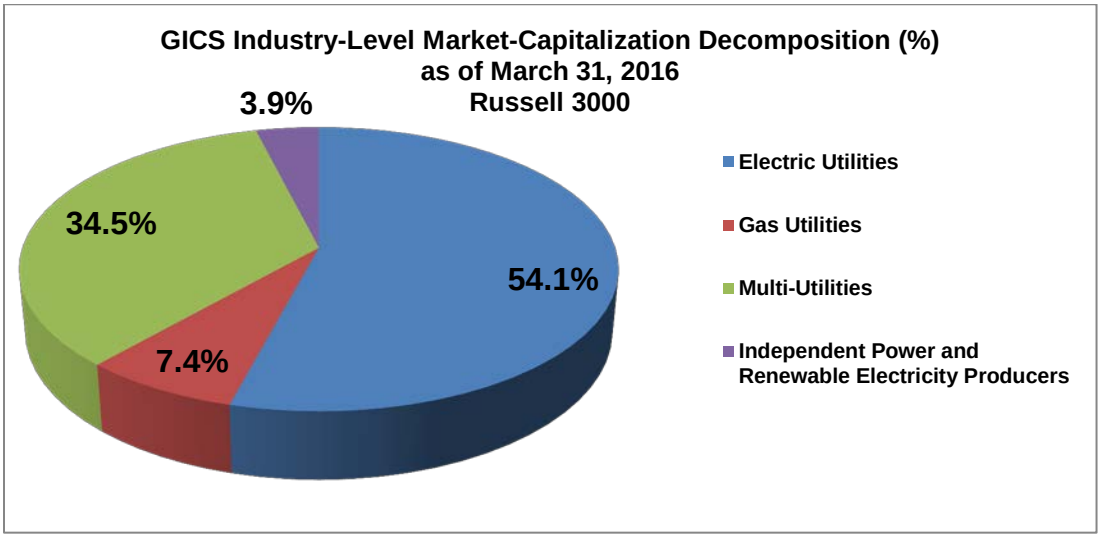
	Signal	Description	Order
Value	Dividend Yield	Common dividend per share divided by close price.	D
	EBITDA / EV	Earnings before interest expenses, income taxes, depreciation and amortization divided by enterprise value.	D
PMom	12-Month Momentum less most recent month	Cumulative stock return from 12 months ago to 1 month ago.	D
Quality	Net Profit Margin	Net income before extraordinary items divided by total revenue.	D
	ROA	Net income before extraordinary items divided by average total assets.	D
Growth	Net Income Growth	Year-on-year % change in net income before extraordinary items.	D

A.8.2 Utility-Specific vs. Generic Signals

Generic or Industry-Specific	Signal	Start Date	Average Count	Annualized Long-Only Active Return	Annualized Long-only Information Ratio	Long-Only Active Return Hit Rate	Annualized Long-Short Return	Monthly IC
Generic - Value	EBITDA / EV	3/31/1997	74	2.69%**	0.470	55.0%	5.80%***	0.028***
Industry Specific - Value	Adjusted OCF / Market Cap	3/31/1997	73	3.96%***	0.733	57.6%**	8.87%***	0.056***
Generic - Quality	ROA	3/31/1997	74	-0.97%	-0.189	45.9%	-0.21%	-0.024**
Industry Specific - Regulatory Environment	Allowed Return on Rate Base	3/31/1997	76	2.37%**	0.463	53.2%	3.30%**	0.015*

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.
Source: S&P Global Market Intelligence Quantamental Research. For all exhibits, all returns and indices are unmanaged, statistical composites and their returns do not include payment of any sales charges or fees an investor would pay to purchase the securities they represent. Such costs would lower performance. It is not possible to invest directly in an index. Past performance is not a guarantee of future results. Data as at 07/31/2016.

A.9 GICS Industry-Level Market-Capitalization Decomposition (%)



Note: S&P Global Market Intelligence's Energy database (Source: SNL Energy) does not cover water utilities (GICS industry = 551040) yet. If water utilities are included, the electric- and multi-utilities' total market-cap is 86.0% of the total market-cap of the utilities sector, instead of 88.6%. Source: S&P Global Market Intelligence Quantamental Research and SNL Energy. Data as at 10/31/2016.

Our Recent Research

October 2016: A League of their Own: Batting for Returns in the REIT Industry - Part 2
SNL Financial's ("SNL") 1 global real estate database contains property level and geographical market-based demographic information that can be difficult for investors to obtain. These unique data points are valuable to investors seeking an understanding of the relationship between property level information and future stock price movement. In this report, we demonstrate how investors can use these data points as alpha strategies. Our back-tests suggest that metrics constructed from property level information may provide insights about future price direction not captured by fundamental or estimates data. Investors may want to consider incorporating information on a REIT's property portfolio when building a robust REIT strategy

September 2016: A League of their Own: Batting for Returns in the REIT Industry - Part 1
This month REITs (Real Estate Investment Trusts) have been separated from the GICS (Global Industry Classification Standard) Financial sector into a sector of their own. Even prior to the sector reclassification, investors have been attracted to REITs' strong performance and attractive yield. REITs differ from traditional companies in several important ways. Metrics that investors typically use to value or evaluate the attractiveness of stocks such as earnings yield or book-to-price are less meaningful for REITs. For active investors interested in understanding their REITs portfolio, an understanding of the relationship between REIT financial ratios and price appreciation is instructive. Is dividend yield relevant? What about funds from operations ("FFO"), one of the most widely used metrics?

August 2016: Mergers & Acquisitions: The Good, the Bad and the Ugly (and how to tell them apart)
In this study we show that, among Russell 3000 firms with acquisitions greater than 5% of acquirer enterprise value, post-M&A acquirer returns have underperformed peers in general. Specifically, we find that:

- Acquirers lag industry peers on a variety of fundamental metrics for an extended period following an acquisition.
- Stock deals significantly underperform cash deals. Acquirers using the highest percentage of stock underperform industry peers by 3.3% one year post-close and by 8.1% after three years.
- Acquirers that grow quickly pre-acquisition often underperform post-acquisition.
- Excess cash on the balance sheet is detrimental for M&A, possibly due to a lack of discipline in deploying that cash.

July 2016: Preparing for a Slide in Oil Prices -- History May Be Your Guide
With the price of West Texas Intermediate (WTI) in the mid-forties, oversupply concerns and the continued threat of a global slowdown have led many to fear a resumed oil price decline. The year-to-date performance of Oil & Gas (O&G) companies, particularly Integrated O&G entities has been strong, further contributing to concerns that oil may be poised to retrench.

June 2016: Social Media and Stock Returns: Is There Value in Cyberspace?
This review of social media literature represents a selection of articles we found particularly pragmatic and/or interesting. Although we have not done research in the area of social

media, we are always on the hunt for interesting insights, and offer these papers for your thoughtful consideration.

April 2016: An IQ Test for the "Smart Money" – Is the Reputation of Institutional Investors Warranted?
This report explores four classes of stock selection signals associated with institutional ownership ('IO'): Ownership Level, Ownership Breadth, Change in Ownership Level and Ownership Dynamics. It then segments these signals by classes of institutions: Hedge Funds, Mutual Funds, Pension Funds, Banks and Insurance Companies. The study confirms many of the findings from earlier work – not only in the U.S., but also in a much broader geographic scope – that Institutional Ownership may have an impact on stock prices. The analysis then builds upon existing literature by further exploring the benefit of blending 'IO' signals with traditional fundamental based stock selection signals.

March 2016: Stock-Level Liquidity – Alpha or Risk? - Stocks with Rising Liquidity Outperform Globally
Most investors do not associate stock-level liquidity as a stock selection signal, but as a measure of how easily a trade can be executed without incurring a large transaction cost or adverse price impact. Inspired by recent literature, such as Bali, Peng, Shen and Tang (2012), we show globally that a strategy of buying stocks with the highest one-year change in stock-level turnover has historically outperformed the market and has outperformed strategies of buying stocks with strong price momentum, attractive valuation, or high quality. One-year change in stock-level turnover has a low correlation (i.e., <0.15) with commonly used stock selection signals. When it is combined with these signals, the composites have yielded higher excess returns and information ratios (IR) than the standalone raw signals.

February 2016: U.S. Stock Selection Model Performance Review - The most effective investment strategies in 2015
Since the launch of the four S&P Capital IQ® U.S. stock selection models in January 2011, **the performance of all four models (Growth Benchmark Model, Value Benchmark Model, Quality Model, and Price Momentum Model) has been positive each year**. The models' key differentiators – a distinct formulation for large cap versus small cap stocks, incorporation of industry specific information for the financial sector, sector neutrality to target stock specific alpha, and factor diversity – enabled the models to outperform across disparate market environments. In this report, we assess the underlying drivers of each model's performance in 2015 and since inception (2011), and provide full model performance history from January 1987.

January 2016: What Does Earnings Guidance Tell Us? – Listen When Management Announces Good News
This study examines stock price movements surrounding earnings per share (EPS) guidance announcements for U.S. companies between January 2003 and February 2015 using S&P Capital IQ's Estimates database. Companies that experienced positive guidance news, i.e. those that announced optimistic guidance (guidance that is higher than consensus estimates) or revised their guidance upward, yielded positive excess returns. We focus on guidance that is not issued concurrent with earnings releases in order to have a clear

understanding of the market impact of guidance disclosures. We also explore practical ways in which investors may benefit from annual and quarterly guidance information.

December 2015: Equity Market Pulse – Quarterly Equity Market Insights Issue 6

November 2015: Late to File - The Costs of Delayed 10-Q and 10-K Company Filings

October 2015: Global Country Allocation Strategies

September 2015: Equity Market Pulse – Quarterly Equity Market Insights Issue 5

September 2015: Research Brief: Building Smart Beta Portfolios

September 2015: Research Brief – Airline Industry Factors

August 2015: Point-In-Time vs. Lagged Fundamentals – This time i(t')s different?

August 2015: Introducing S&P Capital IQ Stock Selection Model for the Japanese Market

July 2015: Research Brief – Liquidity Fragility

June 2015: Equity Market Pulse – Quarterly Equity Market Insights Issue 4

May 2015: Investing in a World with Increasing Investor Activism

April 2015: Drilling for Alpha in the Oil and Gas Industry – Insights from Industry Specific Data & Company Financials

March 2015: Equity Market Pulse – Quarterly Equity Market Insights Issue 3

February 2015: U.S. Stock Selection Model Performance Review - The most effective investment strategies in 2014

January 2015: Research Brief: Global Pension Plans - Are Fully Funded Plans a Relic of the Past?

January 2015: Profitability: Growth-Like Strategy, Value-Like Returns - Profiting from Companies with Large Economic Moats

November 2014: Equity Market Pulse – Quarterly Equity Market Insights Issue 2

October 2014: Lenders Lead, Owners Follow - The Relationship between Credit Indicators and Equity Returns

August 2014: Equity Market Pulse – Quarterly Equity Market Insights Issue 1

July 2014: Factor Insight: Reducing the Downside of a Trend Following Strategy

May 2014: **Introducing S&P Capital IQ's Fundamental China A-Share Equity Risk Model**

April 2014: **Riding the Coattails of Activist Investors Yields Short and Long Term Outperformance**

March 2014: **Insights from Academic Literature: Corporate Character, Trading Insights, & New Data Sources**

February 2014: **Obtaining an Edge in Emerging Markets**

February 2014: **U.S Stock Selection Model Performance Review**

January 2014: **Buying Outperformance: Do share repurchase announcements lead to higher returns?**

October 2013: **Informative Insider Trading - The Hidden Profits in Corporate Insider Filings**

September 2013: **Beggar Thy Neighbor – Research Brief: Exploring Pension Plans**

August 2013: **Introducing S&P Capital IQ Global Stock Selection Models for Developed Markets: The Foundations of Outperformance**
July 2013: **Inspirational Papers on Innovative Topics: Asset Allocation, Insider Trading & Event Studies**

June 2013: **Supply Chain Interactions Part 2: Companies – Connected Company Returns Examined as Event Signals**

June 2013: **Behind the Asset Growth Anomaly – Over-promising but Under-delivering**

April 2013: **Complicated Firms Made Easy - Using Industry Pure-Plays to Forecast Conglomerate Returns**.

March 2013: **Risk Models That Work When You Need Them - Short Term Risk Model Enhancements**

March 2013: **Follow the Smart Money - Riding the Coattails of Activist Investors**

February 2013: **Stock Selection Model Performance Review: Assessing the Drivers of Performance in 2012**

January 2013: **Research Brief: Exploiting the January Effect Examining Variations in Trend Following Strategies**

December 2012: Do CEO and CFO Departures Matter? - The Signal Content of CEO and CFO Turnover

November 2012: 11 Industries, 70 Alpha Signals -The Value of Industry-Specific Metrics

October 2012: Introducing S&P Capital IQ's Fundamental Canada Equity Risk Models

September 2012: Factor Insight: Earnings Announcement Return – Is A Return Based Surprise Superior to an Earnings Based Surprise?

August 2012: Supply Chain Interactions Part 1: Industries Profiting from Lead-Lag Industry Relationships

July 2012: Releasing S&P Capital IQ's Regional and Updated Global & US Equity Risk Models

June 2012: Riding Industry Momentum – Enhancing the Residual Reversal Factor

May 2012: The Oil & Gas Industry - Drilling for Alpha Using Global Point-in-Time Industry Data

May 2012: Case Study: S&P Capital IQ – The Platform for Investment Decisions

March 2012: Exploring Alpha from the Securities Lending Market – New Alpha Stemming from Improved Data

January 2012: S&P Capital IQ Stock Selection Model Review – Understanding the Drivers of Performance in 2011

January 2012: Intelligent Estimates – A Superior Model of Earnings Surprise

December 2011: Factor Insight – Residual Reversal

November 2011: Research Brief: Return Correlation and Dispersion – All or Nothing
October 2011: The Banking Industry

September 2011: Methods in Dynamic Weighting

September 2011: Research Brief: Return Correlation and Dispersion

July 2011: Research Brief - A Topical Digest of Investment Strategy Insights

June 2011: A Retail Industry Strategy: Does Industry Specific Data tell a different story?

May 2011: Introducing S&P Capital IQ's Global Fundamental Equity Risk Models

May 2011: Topical Papers That Caught Our Interest

April 2011: Can Dividend Policy Changes Yield Alpha?

April 2011: CQA Spring 2011 Conference Notes

March 2011: How Much Alpha is in Preliminary Data?

February 2011: Industry Insights – Biotechnology: FDA Approval Catalyst Strategy

January 2011: US Stock Selection Models Introduction

January 2011: Variations on Minimum Variance

January 2011: Interesting and Influential Papers We Read in 2010

November 2010: Is your Bank Under Stress? Introducing our Dynamic Bank Model

October 2010: Getting the Most from Point-in-Time Data

October 2010: Another Brick in the Wall: The Historic Failure of Price Momentum

July 2010: Introducing S&P Capital IQ's Fundamental US Equity Risk Model