

Drilling for Alpha in the Oil & Gas Industry

Insights from Industry Specific Data & Company Financials

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During the recent slide in oil prices, clients frequently asked us which strategies have historically been effective in selecting stocks in declining energy markets. This report answers this question, along with its corollary: which strategies work in rising energy markets? We also explore the value of oil & gas reserve data used by fundamental analysts/investors, but not used in a majority of systematic investment strategies. The analysis in this report should help both fundamental and quantitatively-oriented investors determine how to best use industry-specific and generic¹ investment metrics when selecting securities from a pool of global oil & gas companies.

Our findings, based on S&P Capital IQ's Global Point-in-Time database, include the following:

- **Strategies that outperformed² in falling energy markets favored large capitalization companies with strong cash flows and low capital expenditure (CAPEX) requirements.** For example, Free Cash Flow Yield outperformed by 12.24% on an annualized basis [see Table 6 for complete list]. We view these metrics as related to the “survivability” of the company as industry conditions worsen.
- **In rising energy markets, companies with attractive valuation multiples and rising analyst EPS revisions outperformed their peers** [see Table 7].
- **Our results suggest that investors should focus on reserve depletion metrics and on the cost of finding new reserves.** Both of these factors are widely used by industry analysts, as they reflect key drivers of long-term profitability for exploration and production firms [Table 1].
- **Strategies constructed using oil & gas reserve data usually have low correlation to popular generic metrics (such as valuation and quality),** suggesting that performance of generic based strategies can be improved by adding metrics derived from reserve data [Figure 2].
- A strategy that combined both industry and generic factors **generated returns³ that were at least 70% higher** than those of either the industry or generic strategies⁴.
- **The turnover of the strategy based on the combination of generic and industry specific metrics was similar** to those based solely on either industry or generic metrics.

¹ Generic factors/strategies refer to metrics and ratios constructed using data items from the income, balance sheet and cash flow statements; industry factors / strategies refer to metrics and ratio constructed using reserve data.

² Outperformance or long-only active return was measured as the equal-weighted return of the top 25% of stocks based on a metric minus the equal weighted return of oil & gas companies in the S&P Global Broad Market Index

³ Equal-weighted long-only active returns constructed as described in footnote #2

⁴ The combined strategy's returns were still significant after controlling for the effects of beta, size and value.

1 Industry Factors Formulation & Testing

In interviews with oil and gas analysts, we identified a number of key industry metrics used to estimate the future profitability and value of oil & gas companies. We list these metrics in Figure 1 where “descending” implies that companies with higher factor values are preferred. Conceptually, we grouped these metrics into four categories – reserve acquisition cost/depletion rate; valuation; growth; and product margin.

Figure 1: Definition of Oil & Gas Industry Factors

| | Factor | Description | Direction |
|---|--|---|------------|
| Reserves Acquisition, Cost and Depletion Rate | Proved Reserves / \$ Market Cap ["ProvdResMcap"] | The valuation of oil & gas firms is tied closely to the level of reserves they hold. This signal measures the amount of reserves an oil & gas company holds relative to its market capitalization. | Descending |
| | Reserve Acquisition Cost [Year-on-Year Change in Proved Reserves / [Exploration + Development Cost]] | This signal measures exploration and development costs associated with acquiring and increasing reserves. | Descending |
| | Reserve Exhaustion Rate | Measures the number of days it will take for a company's reserves to be exhausted given current daily production rate, assuming reserves are static [no additional reserves acquired]. | Descending |
| | Reserve Replacement Ratio | This represents the percentage of annual production that was replaced with new reserves in a given period. | Descending |
| Valuation | Future Cashflow Yield [Estimated Future cash flow / Market Cap] | Oil & gas companies include estimates of future cash inflow from proved reserves. Inflows are estimated using assumptions for oil and gas prices. This signal uses this information together with market cap to determine how attractive a security is relative to its peers. | Descending |
| | Price Per Flowing Barrel ["PPFB"] | Production Barrels per Day / [Market Cap + Debt - Cash] | Descending |
| | Discounted Future Cashflow Yield [Estimated Discounted Future Cash Flow / Market Cap] | Similar to Future Cashflow Yield, this factor uses discounted cash flows (estimated net future cash inflows discounted at a 10% rate) divided by market cap in computing the attractiveness of a stock to its peers. | Descending |
| Growth | 1-Year Growth in Future Cashflow Scaled by Total Assets ["YoYChgFCFAst"] | A growth factor that measures the change in estimated future cashflow scaled by total assets. | Descending |
| | Total Developed Reserves Growth ["TotResG"] | This signal ranks securities based on the 1-year growth in total proved reserves. We prefer companies with strong growth measures. | Descending |
| Product Margin | Oil Margin | This is simply the average price of a barrel of oil sold minus the cost of producing that barrel, divided by average price per barrel. | Descending |
| | Gas Margin | The average price per unit of gas minus the cost of producing a unit, divided by the price of a unit. | Descending |

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014.

1.1 Oil & Gas Industry Factors: Backtest Results

We examine these industry factors empirically and evaluate their effectiveness for oil & gas companies within the S&P Broad Market Index [BMI]. The results, displayed in Table 1, include:

- Start date [the date backtests⁵ commenced for a given factor]
- Average count of stocks with data over the backtest horizon

⁵ A backtest estimates the performance of a strategy over a specified look-back window using historical data.

- Annualized long-only equal-weighted active return, information ratios and hit rate⁶
- Annualized equal-weighted long-short returns⁷
- Average 1-month information coefficients [IC]⁸

All performance metrics in this report are from backtests, including returns, which are equal-weighted, annualized and in USD, except where otherwise stated. Long-only active and long-short returns were calculated using quartiles.

Table 1: Oil & Gas Factors Performance Summary
S&P BMI Global Index (Oil & Gas Companies): Start Date – December 2014

| Factor | Start Date | Average Count | Annualized Long-Only Active Return | Annualized Information Ratio [Long Only Active Return] | Hit Rate [Long Only Active Return] | Annualized Long-Short Return | 1-month Information Coefficient [IC] |
|---|------------|---------------|------------------------------------|--|------------------------------------|------------------------------|--------------------------------------|
| Reserve Acquisition, Cost & Depletion Rate | | | | | | | |
| Reserve Acquisition Cost | April 2000 | 96 | 2.51% | 0.41 | 57%* | 7.93%** | 0.025** |
| Reserve Replacement Ratio | April 2001 | 43 | 1.15% | 0.11 | 54% | 2.79% | 0.016 |
| Proved Reserves / \$ Market Cap | April 2000 | 160 | 1.06% | 0.10 | 50% | 4.70% | 0.008 |
| Reserve Exhaustion Rate | April 2000 | 107 | 4.22%** | 0.54 | 57%* | 7.03%* | 0.020* |
| Valuation | | | | | | | |
| Future Cashflow Yield | April 2000 | 98 | 0.90% | 0.09 | 47% | 3.84% | 0.016 |
| Discounted Future Cashflow Yield | April 2000 | 98 | 1.34% | 0.12 | 46% | 3.31% | 0.009 |
| Price Per Flowing Barrel | April 2000 | 120 | 3.60% | 0.38 | 50% | 6.79% | 0.013 |
| Growth | | | | | | | |
| Reserves Per Share Growth | April 2000 | 96 | -0.91% | -0.12 | 47% | 4.79% | 0.015 |
| Year-on-Year Chg Future CF / Assets | April 2000 | 96 | 0.20% | 0.02 | 49% | -0.8% | 0.005 |
| Product Margin | | | | | | | |
| Oil Margin ⁺ | Jan 2006 | 32 | 11.48%*** | 0.92 | 55% | 21.88%** | 0.042** |
| Gas Margin ⁺ | Jan 2006 | 28 | 0.37% | 0.04 | 50% | 5.83% | -0.003 |

⁺About 80% of securities with data are Canadian. Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level.

. Back tested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. 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.

The most promising factors are in the reserve acquisition, cost & depletion rate, and product margin categories. Reserve Acquisition Cost [which looks at the cost of acquiring new reserves] and Reserve Exhaustion Rate [which rewards companies with higher reserves to current production level] both achieved statistically significant annualized long-short returns, ICs and hit rates. In addition, Reserve Exhaustion Rate's annualized long-only active return [4.22%] is significant at the 5% level.

⁶ Long-only active equal-weighted return is the equal-weighted return of the top 25% of stocks [based on a metric] minus the equal-weighted return to the S&P BMI Oil & Gas universe as defined in this report; **Information ratio** is calculated as the annualized long-only active return divided by annualized standard deviation of those returns; **hit rate** is the count of monthly positive long-only active returns divided by the count of the entire monthly history.

⁷ Long-short return is the equal-weighted return of the top 25% of stocks [based on a metric] minus the equal-weighted return of the bottom 25% of stocks, based on the same metric.

⁸ IC is the rank correlation of alpha forecasts to forward stock return.

The results for the valuation and growth factors are disappointing. While all three factors in the valuation bucket had positive performance metrics, none proved statistically significant. Both growth factors had the weakest long-only active returns out of all the 11 metrics we tested. Growth factors on their own may not paint a complete picture of how attractive an oil & gas company is, and may need to be used with other factors to make them meaningful. For example, Reserve Acquisition Cost combines both reserves growth [new reserves acquired] and the cost of the acquired reserves. It is possible that a firm is attractive in terms of growth, but this “growth” was achieved at a significant cost.

1.2 Generic Factors: Backtest Results

We benchmarked the performance of the oil & gas factors discussed in the previous section to several metrics commonly used by equity analysts. We also took into consideration metrics suggested by S&P Capital IQ fundamental analysts who cover the energy sector. Finally, we considered metrics that backtested well within the energy sector amongst the 400+ strategies we track on S&P Capital IQ’s web-based factor research library [“Alpha Factor Library” or “AFL”]. The factors we selected, and the investment style each one represents are listed below:

- EBITDA-to-Enterprise Value [EBITDA/EV] – Valuation
- Free Cash Flow Yield [FCFP] – Valuation
- 3-month Change in Fiscal Year 1 Estimates [3MRevFY1] – Analyst Expectation
- Return on Equity [ROE] – Capital Efficiency
- Capital Acquisition Ratio [CAPACQ]: Operating Cash flow/ CAPEX – Capital Efficiency
- 1-Year Change in Earnings per Share [1YEPSG] – Growth
- 12-month Price Momentum [12MPriceMOM] – Price Momentum

Table 2: Generic Factors Performance Summary
S&P BMI Global Index [Oil & Gas Companies]: April 2000 – December 2014

| Factor | Start Date | Average Count | Annualized Long-Only Active Return | Annualized Information Ratio [Long Only Active Return] | Hit Rate [Long Only Active Return] | Annualized Long-Short Return | 1-month Information Coefficient [IC] |
|-------------|------------|---------------|------------------------------------|--|------------------------------------|------------------------------|--------------------------------------|
| EBITDA/EV | April 2000 | 217 | 5.57%** | 0.86 | 59%** | 15.27%*** | 0.054*** |
| FCFP | April 2000 | 216 | 5.66%** | 0.75 | 55% | 11.73%** | 0.048*** |
| 3MRevFY1 | April 2000 | 176 | 4.38%** | 0.60 | 55% | 8.35%*** | 0.030*** |
| ROE | April 2000 | 219 | 4.22%** | 0.63 | 57%* | 11.40%*** | 0.055*** |
| CAPACQ | April 2000 | 216 | 5.29%** | 0.64 | 57%* | 12.78%*** | 0.050*** |
| 1YEPSG | April 2000 | 168 | -0.62% | -0.10 | 46% | 1.85% | 0.020** |
| 12MPriceMOM | April 2000 | 218 | 6.26%*** | 0.66 | 59%** | 12.92%*** | 0.049*** |

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level.

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014. Back tested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. 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.

Considering that several of the generic factors we selected were those that back-tested well historically, it is perhaps not surprising that they appear to be superior [Table 2] to the factors constructed using reserve and production data shown in Table 1. Several of the generic strategies [FCFP and CAPACQ] capture two metrics – cash flow and capital expenditures – important to the future profitability of oil & gas firms. Given the significant capital outlays required to find new oil reserves, CAPEX and cash flows are two of the most watched industry metrics. FCFP and CAPACQ were amongst the top factors with annualized long-only active returns of 5.66% and 5.29% respectively [significant at the 5% level].

The question that comes to mind at this point is: why not focus solely on the generic factors since they appear to be superior to the industry factors based on our tests? The obvious response is that industry factors may be uncorrelated with generic factors, thus offering some benefit to any existing strategy. We explore this concept in the next section.

1.3 Factor Correlation

The factor rank correlation matrix⁹ of the generic and industry factors is displayed in Figure 2¹⁰. Due to space constraints, we only show the correlation coefficients of generic factors with industry factors. The correlation matrix suggests that industry metric are reasonably different from their generic counterparts. The largest absolute correlation coefficient is 0.38 [Price per Flowing Barrel and EBITDA/EV], and there are several factors with correlation coefficients close to zero. We will next explore the potential reward of combining both industry and generic factors.

Figure 2: Monthly Factor Rank Correlation Matrix
S&P BMI Global Index [Oil & Gas Companies]: April 2000 – December 2014

| | FCFP | EBITDA/EV | 1YEPSG | ROE | CAPACQ | 12MPrice MOM | 3MRevFY1 |
|----------------------------------|---------|-----------|--------|-------|--------|-----------------|----------|
| Reserve Acquisition Cost | -0.06 | -0.07 | 0.08 | 0.06 | -0.10 | 0.02 | -0.01 |
| YoY Chg Future CF / Assets | -0.01 | -0.04 | 0.19** | 0.11 | -0.04 | 0.05 | -0.01 |
| Gas Margin | -0.05 | 0.012 | 0.05 | 0.07 | 0.01 | -0.018 | -0.01 |
| Oil Margin | 0.04 | 0.00 | 0.07 | 0.03 | 0.03 | 0.06 | -0.04 |
| Reserve Replacement Ratio | -0.01 | -0.09 | 0.02 | 0.02 | -0.01 | 0.10 | 0.04 |
| Future Cashflow Yield | 0.30*** | -0.11 | -0.03 | -0.02 | 0.04 | -0.25*** | -0.10 |
| Discounted Future Cashflow Yield | -0.09 | 0.30*** | -0.03 | -0.03 | 0.06 | -0.25*** | -0.08 |
| Reserve Exhaustion Rate | -0.07 | -0.10 | 0.02 | 0.03 | -0.13 | 0.05 | 0.04 |
| Price Per Flowing Barrel | -0.02 | 0.38*** | -0.08 | -0.06 | 0.12 | -0.26*** | -0.05 |
| Reserves Per Share Growth | -0.04 | -0.026 | 0.05 | 0.08 | -0.03 | 0.013 | 0.03 |
| Proved Reserves / \$ Market Cap | 0.29*** | -0.13** | -0.05 | -0.04 | 0.05 | -0.28*** | -0.07 |

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014.

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level.

2 Strategy Development Using Industry and Generic Factors

Our intent is to show a practical way to incorporate oil & gas reserve information in an investment process. We start by examining the return characteristics of stand-alone industry and generic

⁹ This is the average of the monthly cross sectional rank correlation coefficients.

¹⁰ See Appendix A for the rank correlation of industry factors.

strategies, using factors that were classified as either industry or generic. We then explore combining both stand-alone strategies.

2.1 Stand-Alone Industry and Generic Composite Strategies

The stand-alone generic strategy is an equal weighted combination of all 7 generic factors described in Section 1.2. The stand-alone industry strategy excludes both Oil & Gas Margin factors [due to short data history], and also Discounted Future Cash flow Yield [due to high return correlation with Future Cash flow Yield, see Appendix A]. Finally, we chose Reserves per Share Growth over YoY Chg Future CF / Assets [due to the former's slightly lower correlation with other industry metrics]. We are left with 7 industry factors, which were equal-weighted to create the industry composite strategy. For both generic and industry strategies, we require that a security has data for at least three factors in order for it to be included in its respective composite strategy.

Table 3: Industry & Generic Composite Strategy Performance
S&P BMI Global Index [Oil & Gas Companies]: April 2000 – December 2014

| Strategy | Annualized Long-Only Active Return | Annualized Information Ratio [Long Only Active Return] | Hit Rate [Long Only Active Return] | Annualized Long-Short Return | 1-month Information Coefficient [IC] |
|-------------------|------------------------------------|--|------------------------------------|------------------------------|--------------------------------------|
| Industry Strategy | 4.07%* | 0.49 | 52% | 9.55%*** | 0.029*** |
| Generic Strategy | 5.06%** | 0.57 | 60%*** | 15.72%*** | 0.067*** |

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level.

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014. Back tested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. 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.

The generic strategy appears to be superior to the industry strategy across all the performance parameters we looked at [Table 3]. However, we are encouraged by the performance of the industry strategy. The industry strategy still generated statistically significant top quartile long-only active return [4.07%], long-short spread [9.55%] and 1-month IC [0.029], despite the fact that only two of the seven underlying factors used to construct the strategy had significant active returns and ICs [Table 1].

2.2 Combining Both Strategies

In this section, we discuss one method of combining both industry and generic strategies. This approach, which we call a **ranked combination strategy**, involves equal-weighting the ranks of both the industry and generic strategies. The top 25% [top quartile] of stocks with the best combined scores are assigned to the long-only portfolio, while the bottom 25% [bottom quartile] of stocks with the worst combined scores are placed in the short-side portfolio.

We show the results of the ranked combination strategy in Table 4, including the results of the stand-alone industry and generic strategies as reference points. The penultimate column in the table shows the difference in long-only active returns between the ranked combination strategy

and the industry strategy, while the last column shows the difference in long-only active returns between the ranked combination strategy and the generic strategy.

**Table 4: Performance of Stand-Alone & Combined Strategies
S&P BMI Global Index (Oil & Gas Companies): April 2000 – December 2014**

| Strategy | Annualized Long-Only Active Return | Annualized Information Ratio [Long Only Active Return] | Hit Rate [Long Only Active Return] | Annualized Long-Short Return | Difference from Industry Strategy [Long-Only Active Return] | Difference from Generic Strategy [Long-Only Active Return] |
|--------------------|------------------------------------|--|------------------------------------|------------------------------|---|--|
| Industry Strategy | 4.07%* | 0.49 | 52% | 9.55%*** | | |
| Generic Strategy | 5.06%** | 0.57 | 60%*** | 15.72%*** | | |
| Ranked Combination | 8.63%*** | 1.22 | 63%*** | 19.91%*** | 4.56%* | 3.57%* |

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level.

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014. Back tested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. 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.

The ranked combination strategy dominates the industry/generic strategies across all performance metrics, suggesting that the low correlation between industry and generic factors was beneficial. The annualized long-only active return of the ranked combination strategy was twice that of the industry strategy, and about 70% larger than that of the generic strategy. The ranked combination strategy also has information ratios that are twice as large as those of the industry/generic strategies. In addition, the difference in long-only active return between the ranked combination and industry/generic strategy is statistically significant.

2.3 Are the Strategy Returns Driven By Value, Low Volatility or Size?

Whilst our backtests showed statistically significant top quartile active return for the ranked combination strategy (second column, Table 4), it is possible that what we are capturing are the risk-premia associated with value, low volatility and size. To ensure this is not the case, we run a regression of the monthly top-quartile excess return of each of the three strategies against the monthly long-short returns of the following factor portfolios - 60-month beta; size; and book-to-price¹¹. Regression results are displayed in Table 5. To make the comparison easier to visualize, we restate the top-quartile annualized active return of Table 4 in the first row of Table 5. The second row of Table 5 is the intercept from the regression which indicates the return of each strategy beyond the three risk factors. The last three rows are the coefficients of each of the three strategies' returns to beta (high beta - low beta), size (small cap - large cap) and book-to-price (high - low).

¹¹ Beta, Size and Book-to-Price portfolios were constructed using securities in the S&P BMI universe (oil & gas companies).

**Table 5: Top Quartile Annualized Active Return: Regression Results
S&P BMI Global Index (Oil & Gas Companies): April 2000 – December 2014**

| | Industry Strategy | Generic Strategy | Ranked Combination |
|---------------------------------|-------------------|------------------|--------------------|
| Annualized Return | 4.07%* | 5.06%** | 8.63%*** |
| Regression: Annualized Return | 4.15%** | 3.48%** | 7.55%*** |
| High Beta - Low Beta | 0.19*** | -0.05 | 0.05 |
| Small Cap - Large Cap | 0.03 | -0.29** | -0.19*** |
| High B/P - Low B/P ⁺ | 0.15*** | -0.03 | 0.00 |

⁺B/P is for Book-to-Price

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level. Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014. Back tested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. 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

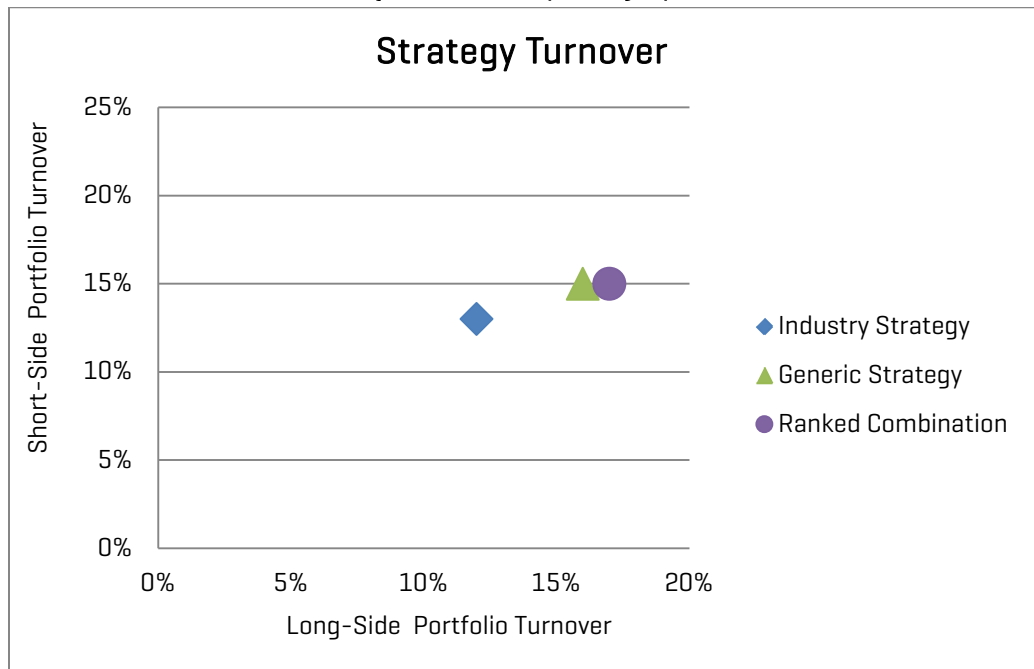
The annualized top-quartile active return of each strategy is still statistically significant after the regression analysis (row 2), although they are now smaller in magnitude (except for the industry stand-alone strategy). In particular, the stand-alone industry strategy has positive exposures to high beta and book-to-price energy names (rows 3 and 5). The original returns for the generic strategy and ranked combination strategy (row 1) benefitted from a positive exposure to large cap energy names. After controlling for all three risk factors, we observed a drop in top-quartile active returns for the last two strategies.

2.4 Strategy Turnover

One possible deterrent to incorporating industry signals into an existing stock selection process is the potential impact on portfolio turnover. If portfolio churn increases significantly, it may erode the higher returns highlighted in Table 4. We measure portfolio turnover over two consecutive months as the number of stocks that depart the long [short] portfolio in the second month divided by the total number of stocks in the long [short] portfolio in the first month. The average of this ratio over our test period is the turnover for the respective strategy.

The industry strategy has the lowest turnover for both the long and short side portfolios (Figure 3). The long-only [short-side] portfolio churn for the ranked combination and generic strategies are similar at 17%[15%], suggesting that portfolio turnover will likely not be materially impacted if industry factors are introduced into an existing investment process.

*Figure 3: Turnover of Long and Short Portfolios
S&P BMI Global Index (Oil & Gas Companies): April 2000 – December 2014*



Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014.

3 Regime Analysis: Falling & Rising Energy Markets

Which factors work in falling and rising energy markets? We identified these two different market environments using monthly changes in the spot price of West Texas Intermediate [WTI]¹². We define the falling energy market regime as all monthly instances where the change in spot WTI price is worse than -5% [40 instances]. Conversely, we define a rising energy market regime as all monthly instances where the change in spot WTI price is greater than +5% [54 instances]. All other periods not classified into falling or rising energy markets are grouped into the “normal market” regime [84 instances].

3.1 Falling Energy Markets

We show the annualized top quartile active return of some of the best factors (industry & generic) in falling energy markets in Table 6. The second column shows annualized active returns in a falling energy market regime, while the last column shows performance in normal energy markets [when oil prices are neither falling nor rising by more than 5%]. The regime analysis suggests that large cap companies with relatively low capital expenditures [CAPEX] requirements, high free cash flows, and low to modest debt levels outperform their peers when oil prices fall. Companies with high CAPEX requirements and weak cash flows may have to cut back on capital outlays necessary to sustain/increase production as the price of oil falls. In addition, debt service may become more challenging for companies with high debt profiles as revenues decline with falling oil prices.

¹² Data as at 01/31/2015 from the Federal Reserve Bank of St Louis <http://research.stlouisfed.org/fred2/>

**Table 6: Factor Performance in Falling & Normal Energy Market Regimes
S&P BMI Global Index (Oil & Gas Companies): April 2000 – December 2014**

| Factor | Falling Energy Markets [Monthly Oil Price Change < -5%] | Normal Energy Markets [Monthly Oil Price Change between -5% and 5%] |
|--|--|--|
| Log of Sales [Size] ⁺ | 17.28%** | 0.48% |
| ROE | 13.80%*** | 1.80% |
| Sales / Enterprise Value | 12.63%* | 5.17% |
| Free Cash Flow Yield | 12.24%** | 2.88% |
| Free Cash Flow / Sales | 11.76%** | 0.00% |
| Interest Coverage ⁺⁺ | 10.92%** | 3.24% |
| Reserve Exhaustion Rate | 10.56%*** | 0.48% |
| 12MPriceMOM | 9.96%** | 4.44% |
| CAPEX / Sales | 9.84%** | -0.18% |
| Number of Fiscal Y1 Revisions ⁺⁺⁺ | 8.76%* | 2.88% |

⁺Ranked in descending order; ⁺⁺ EBIT / interest expense; ⁺⁺⁺ [# of UP revision – # of DOWN revisions] / Total # of revisions

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level.

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014. Back tested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. 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.

While the majority of the factors generate positive active returns in normal energy markets, they are not statistically significant.

3.2 Rising Energy Markets

In rising energy markets, performance is dominated by factors that reflect the strength and ability of a company to generate cash flows, re-enforcing the importance of this metric in the oil & gas industry [Table 7]. Oil & gas companies that have witnessed recent positive analyst upgrades and appear “cheap” based on reserve levels have also historically performed well in this regime.

**Table 7 : Factor Performance in Rising & Normal Energy Market Regimes
S&P BMI Global Index (Oil & Gas Companies): April 2000 – December 2014**

| Factor | Rising Energy Markets [Monthly Oil Price Change > +5%] | Normal Energy Markets [Monthly Oil Price Change between -5% and 5%] |
|---|---|--|
| Operating Cash Flow Yield | 8.16% ** | 2.88% |
| EBITDAEV | 7.93% *** | 6.10% ** |
| Proved Reserves / \$ Market Cap | 7.92% * | 3.56% |
| Book Leverage ⁺ | 7.08% ** | 4.32% |
| Free Cash Flow / Enterprise Value | 6.49% ** | 3.11% |
| 1-Year Growth in Cashflow | 6.00% ** | -3.21% |
| Analyst Recommendation Change ⁺⁺ | 5.64% *** | -0.48% |
| Operating Cash Flow / CAPEX | 5.20% * | 3.48% |
| Free Cash Flow Yield | 5.16% * | 2.88% |
| Free Cash Flow / Sales | 4.92% * | 0.00% |

⁺ Defined as total assets / total equity; ⁺⁺ Defined as average 1-mont change in mean analyst recommendation.

*** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014. Back tested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. 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.

Given that a majority of the factors we listed in both rising and falling energy markets did not generate statistically significant active top quartile returns in “normal markets”, we explored which strategies have generated significant returns in this regime. Similar to the trend we reported in Table 6 and Table 7, the best factors in normal energy markets (based on annualized top quartile active return) are valuation factors, and include - Earnings Yield [4.32%*], EBITDAEV [6.10%**] and EBITDA/Price [6.84%**]. Oil and gas companies that have seen the largest forecast EPS growth over the last 3-month also outperformed [5.52 %**]¹³.

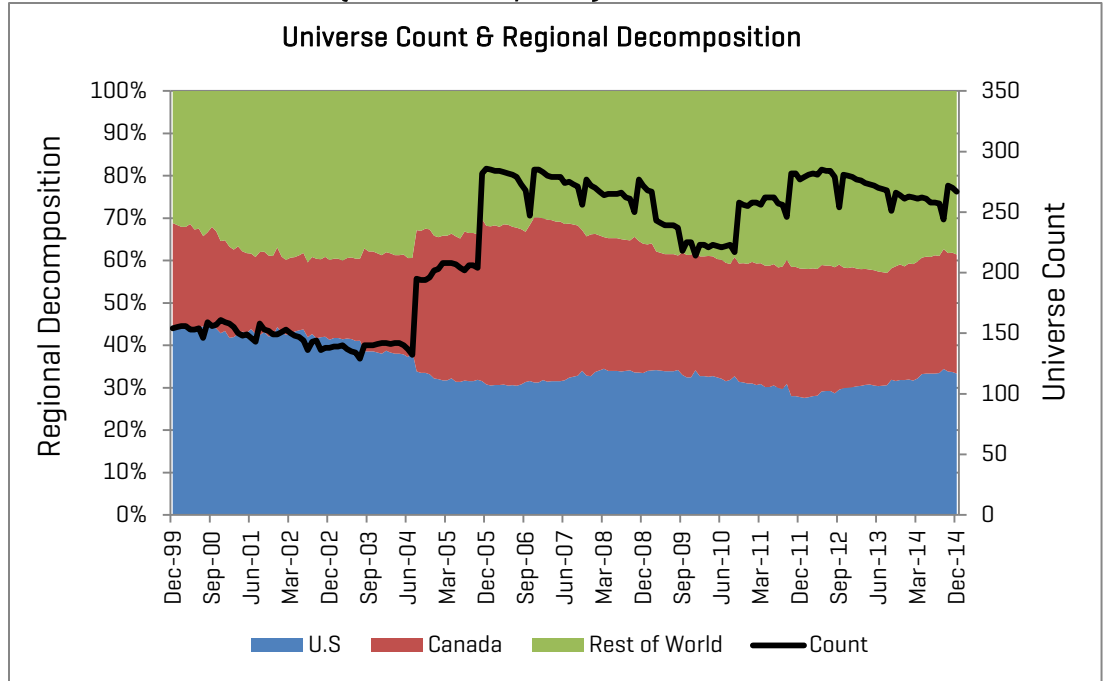
4 Data & Universe Definition

We used S&P Capital IQ’s Global Point-in-Time database for this study. The reserve data comes from the supplemental section of financial reports, which companies are statutorily required to provide. Data generally starts in April 2000 for most of the data items, although coverage for some items is sparse till 2006/2007. Appendix B lists some of the data items available in the database. The universe we used for all backtests in this report is made up of oil & gas companies with GICS sub-industry codes 10102010 [Integrated oil & gas] and 10102020 [oil & gas exploration and production] in the S&P BMI Global Index.

¹³ *** Statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level

Figure 4 shows the time series universe count in addition to a breakdown of securities into three regions – U.S, Canada and Rest of World [S&P BMI Global index ex North America]. The universe count has averaged 224 securities since December 1999, with a low of 132 securities and a high of 286 securities. About 70% of the securities are from North America, with 30% from other countries.

Figure 4: Universe Decomposition
S&P BMI Global Index (Oil & Gas Companies): December 1999 – December 2014



Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014.

5 Conclusion

Reserves are key inputs in assigning value to oil & gas firms. Whilst most fundamental analysts incorporate reserve data in their analysis, most systematic processes do not. Utilizing S&P Capital IQ’s Global Point-in-Time data, we identify a few industry factors with statistically significant long-only active returns over our backtest window. We also confirmed that valuation factors are important metrics that have historically been effective in separating winners from losers in the oil & gas industry. Our empirical analysis also showed that while the stand-alone generic strategy seems superior to the stand-alone industry strategy, combining both strategies generated the best annualized long-only active return, long-short return and risk-adjusted return. Finally, we identified factors that have historically generated statistically significant long-only active returns in rising, falling and normal energy markets.

The 11 factors discussed in this paper will be available on Alpha Factor Library in the coming months. This will deepen the offering of industry specific factors we have on the platform which currently includes banks and retail.

APPENDIX A

Rank Correlation Matrix
S&P BMI Global Universe (Oil & Gas Companies): April 2000 – December 2014

| | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Factor 7 | Factor 8 | Factor 9 | Factor 10 |
|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Factor 1 | | | | | | | | | | |
| Factor 2 | 0.57*** | | | | | | | | | |
| Factor 3 | 0.03 | 0.00 | | | | | | | | |
| Factor 4 | 0.04 | 0.08 | 0.48*** | | | | | | | |
| Factor 5 | 0.20*** | 0.00 | 0.30*** | 0.44*** | | | | | | |
| Factor 6 | 0.05 | -0.02 | 0.04 | 0.10 | 0.03 | | | | | |
| Factor 7 | 0.00 | -0.07 | 0.10 | 0.04 | 0.07 | 0.14 | | | | |
| Factor 8 | -0.03 | -0.08 | 0.17** | 0.33*** | 0.15* | -0.06 | 0.04 | | | |
| Factor 9 | 0.85*** | 0.51*** | 0.02 | 0.01 | 0.18** | 0.00 | 0.00 | -0.04 | | |
| Factor 10 | 0.12 | 0.14* | 0.17** | 0.24** | 0.13* | 0.08 | 0.00 | 0.14* | 0.06 | |
| Factor 11 | 0.31*** | 0.42*** | 0.00 | -0.03 | -0.11 | -0.05 | -0.11 | -0.10 | 0.31*** | -0.13* |

Legend

| | |
|-----------|---|
| Factor 1 | Future Cashflow Yield |
| Factor 2 | Proved Reserves / \$ Market Cap |
| Factor 3 | Reserves Per Share Growth |
| Factor 4 | Reserve Acquisition Cost |
| Factor 5 | YoY Chg Future CF / Assets |
| Factor 6 | Gas Margin ⁺ |
| Factor 7 | Oil Margin ⁺ |
| Factor 8 | Reserve Replacement Ratio ⁺⁺ |
| Factor 9 | Discounted Future Cashflow Yield |
| Factor 10 | Reserve Exhaustion Rate |
| Factor 11 | Price Per Flowing Barrel |

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31, 2014.

⁺ 109 data points; ⁺⁺ 166 data points

***Statistically significant at 1% level; **statistically significant at 5% level; *statistically significant at 10% level.

APPENDIX B:

List of Oil & Gas Data Items Available in the S&P Capital IQ Global Point-in-Time Database

| Data Items | |
|--|---|
| • Acquisition costs (proved & unproved) | • Other Adjustments |
| • Avg Daily Prod | • Other costs |
| • Avg Daily Sales Volume | • Prices (Excluding Hedges) |
| • Avg Sales Price | • Production |
| • Avg Production Cost | • Production Growth |
| • Closing Balance | • Proved Developed Gas Reserves |
| • Daily Production Growth | • Proved UnDeveoped Gas Reserves |
| • Development Reserves – | • Purchases in Place |
| • Development costs | • Reserve Additions (NGL) |
| • Discounted Future CF bf taxes | • Reserve Replacement Ratio |
| • Exploration costs | • Reserve Revisions (NGL) |
| • Extension, Diccoveries & Other Additions | • Revisions of Prior Estimates (Oil, Gas) |
| • Future CFs bf Income Taxes | • Sales Volume Incl affiliates |
| • Future Cash Inflows | • Sales in Place |
| • Future Development Costs | • Standardized DCF |
| • Future Production costs | • Standardized DCF including hedging |
| • Future Income Taxes | • Total Costs Incured |
| • Gross Developed Area | • Total Gas Production |
| • Gross Dev Dry Wells Drilled | • Total Gas Equivalent Production |
| • Gross Dev Productive Wells Drilled | • Total Gross Development Wells Drilled |
| • Gross Exploratory Dry Wells Drilled | • Total Gross Exploratory Wells Drilled |
| • Gross Operated Wells | • Total Gross Productive Wells |
| • Number of rigs | • Total Gross Wells Drilled |
| • Gross Producing Wells | • Total Net Development Wells Drilled |
| • Gross Producing Wells Drilled | • Total Net Exploratory Wells Drilled |
| • Gross Productive Wells | • Total Net Productive Well |
| • Gross Undeveloped Area | • Total Net Wells Drilled |
| • Improved Recovery (Oil, Gas, NGL) | • Total Number of Rigs |
| • Net Developed Area | • Total Oil Equivalent – Production |
| • Net Development Dry Wells Drilled | • Total Possible Gas/Oil Reserves |
| • Net Development Productive Wells Drilled | • Total Probable Gas/Oil Reserves |
| • Next Exploratory Dry Wells Drilled | • Total Production |
| • Net Exploratory Productive wells Drilled | • Total Production Growth |
| • Net Operated Wells | • Total Proved Reserves – Gas/Oil |
| • Net Producing Wells | • Undeveloped Reserves (Oil/Gas) |
| • Net Producing Wells Drilled | • Net Undeveloped Area |
| • Other Adjustments – Future Cash flow | |

Source: S&P Capital IQ Quantamental Research. Data as of Dec. 31 2014.

Our Recent Research

March 2015: [Equity Market Pulse – Quarterly Equity Market Insights Issue 3](#)

Driven by proprietary data and analytics from S&P Capital IQ™, Equity Market Pulse provides professional investors with insights into global equity market fundamentals and performance at a glance. Spanning developed and emerging markets in the Americas, Europe, and Asia, it provides perspective on fundamentals, valuations and investment strategy effectiveness.

February 2015: [U.S. Stock Selection Model Performance Review – The most effective investment strategies in 2014](#)

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 and 2014 was no exception. Our models' key differentiators – distinct formulation for large cap and small cap stocks, special treatment for the financial sector, sector neutrality to target stock specific alpha, and factor diversity – enabled the models to outperform across various market environments. In this report, we review the underlying drivers of each model's performance over the 12 months ended December 31, 2014, document performance from January 2011 when the models went live, and provide full model performance history from January 1987.

January 2015: [Global Pension Plans: Are Fully Funded Plans a Relic of the Past?](#)

In this brief we leverage S&P Capital IQ's extensive collection of pension data to examine:

- Companies with the strongest and weakest pension funding status globally.
- Global trends in pension funding and accounting.
- Companies with the most aggressive versus conservative pension accounting assumptions.
- Underfunded plans with the least and most three-year improvement in funding.

January 2015: [Profitability: Growth-Like Strategy, Value-Like Returns](#)

Value-based strategies have been the favorite weapons in many investors' arsenals, historically yielding large returns and consistently outperforming. Most value investors focus on the price side of the equation – i.e., buying assets that are priced below their intrinsic values. Yet, there's another dimension to the value equation that has been complementary to value and just as critical in generating excess returns. Enter profitability. Profitability has historically worked as an investment strategy because instead of focusing on the cheapness of an asset it focuses on the productiveness of an asset – i.e., its ability to generate earnings for the investor. Our results from January 1996 to August 2014 show: The S&P 500® continues to be the preeminent regional performer in terms of both financial results and price appreciation Risk and Return: Tracks the dynamics of equity market returns and volatility.

November 2014: [Equity Market Pulse – Quarterly Equity Market Insights Issue 2](#)

Driven by S&P Capital IQ's™ proprietary data and analytics, **Equity Market Pulse** provides professional investors with insights into global equity market fundamentals and performance at a glance. Spanning developed and emerging markets in the Americas, Europe, and Asia, it provides perspective on valuations, operating efficiency, and investment strategy effectiveness.

October 2014: [Lenders Lead, Owners Follow – The Relationship between Credit Indicators and Equity Returns](#)

This paper demonstrates a strong link exists between credit events and equity returns, suggesting a potential investment strategy. Whereas previous academic work focused on ratings changes within the U.S., this analysis takes a global perspective and includes the post-financial crisis period. Shareholders should note that even in a benign credit environment Standard & Poor's Ratings Services ["S&P Ratings Services"] downgraded 68 U.S. speculative grade companies in the second quarter of 2014, and forecasts the rate of speculative grade defaults to increase next year to 2.2% from 1.6% in 2014. Year to date, there have been 303 instances where credit default swap spreads have widened by more than 50 basis points.

August 2014: [Equity Market Pulse – Quarterly Equity Market Insights Issue 1](#)

Equity Market Pulse provides professional investors with insights into global equity market fundamentals and performance at a glance. Spanning developed and emerging markets in the Americas, Europe, and Asia, it provides perspective on valuations, operating efficiency, and investment strategy effectiveness. The content of the Equity Market Pulse is driven by S&P Capital IQ's fundamental data and analytics including S&P Capital IQ Estimates, Global Point-in-Time Fundamentals, and the Alpha Factor Library. The analysis is broken into four themes:

July 2014: [Factor Insight: Reducing the Downside of a Trend Following Strategy](#)

In this report, we review an approach that reduces the downside risk of a trend following strategy. This new signal first separates a stock's return into its systematic and stock-specific components, and then picks stocks solely on the latter. We compare the performance of this new signal [alpha momentum] to a typical trend following strategy [total momentum] and report the following:

May 2014: [Introducing S&P Capital IQ's Fundamental China A-Share Equity Risk Model](#)

Factor risk models play an important role in equity portfolio management. Portfolio managers depend upon factor risk models to obtain portfolio risk prediction and risk attribution against a group of largely orthogonal factors each with meaningful econometric explanations. S&P Capital IQ is dedicated to providing a broad set of high-quality models and products to the global asset management community. Since 2010, we have released a series of single country risk models as well as global and regional equity risk models. We are now releasing single country risk model covering China A-Shares equities,

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?](#)

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August 2013: [Introducing S&P Capital IQ Global Stock Selection Models for Developed Markets: The Foundations of Outperformance](#)

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