S&P CAPITAL IQ

QUANTITATIVE RESEARCH

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

In July 2012 we released our regional risk models – the Pan-Asia ex. Japan and the Pan-European Models and updated versions of our US and Global Risk Models. Continuing in our efforts to provide a broad set of models to the asset management community, we are now releasing our second single country risk model – Canada Fundamental Equity Risk Model.

As with our other risk models, the Canada Equity Risk Model is time-series regression-based fundamental factor risk model. The process of building the Canada Risk Model is similar in methodology to that described in our whitepaper "Introducing Capital IQ's Fundamental US Equity Risk Models", Scherer et al (2010).

The highlight of our risk models continues to be our building blocks - "best of breed" point-in-time Capital IQ data, state of the art Alpha Factor Library, Global Industry Classification System (GICS®) and an open and robust risk estimation methodology. The Canada Equity Risk model is built with the goal of generating accurate and robust risk predictions for Canadian equity investors. It is also constructed with a view to provide relevant portfolio risk attributions.

The rest of this whitepaper is organized as follows. In Section 1 we describe the basic methodology and various building blocks related to Canada risk model. In Section 2 we present the test results for the Canada risk model. In Section 3 we show the relevance of using Canada risk model as compared to our Global model. We then conclude in Section 4.

1 Building Canada Fundamental Time Series Risk Model

1.1 Methodology

The Canada Fundamental Factor Risk Model is based on a multi-step time series regression based estimation procedure. The independent factor series include (i) Market returns (ii) Fundamental style factor returns calculated from our alpha factor library and (iii) Industry returns.

For the market return, we use the market cap weighted average return of the Canada model estimation universe. The style factor returns are made up from a number of a long/short cash neutral signal portfolios which are described in Table 1 in Section 1.3. For generating industry returns, since the Canadian equity market is more concentrated in the Energy and Commodity sectors, we use a customized industry grouping (unlike our other risk models) based on GICS® which is described in more detail in Section 1.4

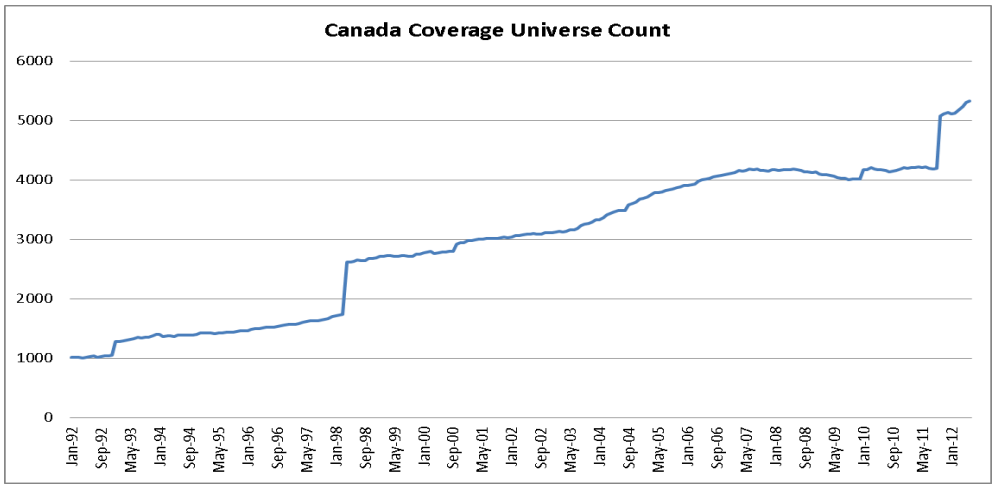
Having assembled the market, raw style and industry returns we apply an orthogonalization procedure. We start with market returns as the most important source of variation. Since market and style returns are correlated we regress the style factor returns against the market and use the residuals from this regression as market neutral style returns, i.e. style returns after the market factor has been taken out. We proceed by calculating market and style neutral industry returns by regressing industry returns against style and market returns and use the residuals from this regression as pure industry returns. This order ensures that the loadings on our comprehensive style factors take precedence in the interpretation of portfolio exposures.

We provide both a Medium Term Model (with correlation and volatility half-lives of 240 and 60 days respectively) and a Short Term Model (with correlation and volatility half-lives of 180 and 30 days respectively). These half-lives are in keeping with our US models.

1.2 Coverage and Estimation Universe

Our Canada Risk Model covers all Canadian equities whose return data are available in the Compustat database. For these purposes Canadian equities are defined as those equities that (i) belong to companies that are domiciled in Canada or (ii) are listed on the Canadian Stock Exchanges. For July 2012, the Canada Risk Model covers about 5300 equities. Figure 1 below shows the coverage count through time for the Canada Risk Model.

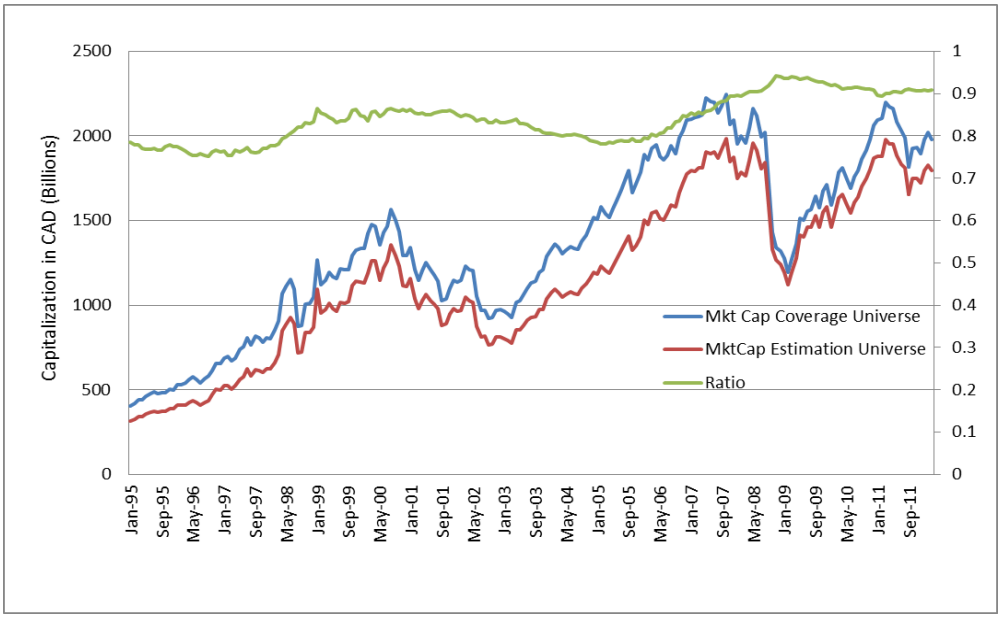
Figure 1: Number of assets covered by the Canada Risk Model



Source: S&P Capital IQ

For the time period before January 2007, the estimation universe (universe used to obtain factor returns) includes the top N stocks in term of market capitalization listed in Toronto Stock Exchange, where N ranges from 125 to 250. We performed this in order to use a relatively constant proportion of the total Canada equity market as the estimation universe. Beginning in 2007 the estimation universe was chosen to be the stocks in the S&P TSX Composite Index. Figure 2 shows estimation, coverage universe market caps and their ratio (right axis). The ratio is reasonably constant staying around 80-90% of the total market cap for the entire time period.

Figure 2: Market Cap Ratio of Estimation and Coverage Universes



Source: S&P Capital IQ. Data ending March 2012.

1.3 Style Returns

The style returns data used is similar to that used in our US and Regional Risk Models. Table 1 gives a summary of the style factor part of the data wherein we used 120+ factors from the S&P Capital IQ (CIQ) Alpha Factor Library grouped into 8 style buckets. Each style factor is constructed from a log market cap weighted long/short cash neutral signal portfolio. These portfolios are derived from a univariate sort according to the chosen characteristic that determines the top 33% of stocks (longs) and the bottom 33% (shorts).

Table 1: Style Factor Descriptions from the S&P Capital IQ Alpha Factor Library

Style	# of signal factors	Sample Components
Analyst Expectation	11	- Earnings & Sales Forecast - Earnings Surprise - Analyst Diffusion - Analyst Revision
Capital Efficiency	10	- Return on Equity & Capital - Leverage & Interest Coverage - Issuance & Buybacks
Earnings Quality	25	- Balance Sheet Accruals - Working Capital & Asset Turnover - Capital Expenditure and R&D Intensity - Margins, Payout Ratio
Historical Growth	31	- 1 & 3-year growth of - Operating & Free Cash Flow - Earnings - Margins
Price Momentum	17	- 1, 6, 9 & 12-Month Price Momentum - Technical indicators over various time frames, including MACD, RSI, Slope, 52 Week High/Low
Size	2	- Log of Market Cap. & Sales
Valuation	25	- Reported & Forward Earnings Yield - Dividend Yield - Book to Price - Sales, EBITDA & Cash Flow to Enterprise Value - Inverse PEGY
Volatility	7	- Realized volatility - CAPM Beta - Distance from High to Low (1 & 12 months) - Trading Volume

Source: S&P Capital IQ.

1.4 Industry Returns

In structured factor risk models, industry returns are used to capture the effects of factors which affect the whole industry. In our US, Global and Regional risk models, we calculate the industry returns at the GICS level 2. Each industry return factor corresponds to one of the 24 industry groups (subsectors) in the GICS Classification. The industry factor return was computed as the log market capitalization weighted mean return of stocks in that industry group. However, Canadian equity market has a very high concentration in Energy, Material and Banks subsectors. As shown in Table 2, the subsectors of Energy, Materials, and Banks together account for 69% of the total market capitalization of the estimation universe, while Household & Personal Products, Health Care Equipment & Services, and Semiconductors & Semiconductor Equipment subsectors each represent less than 0.01%.

Table 2: Market Cap Distribution (GICS Level 2) of Canada Estimation Universe

Sector	Industry Group (Subsector)	Market Cap
Consumer Discretionary	Automobiles &Components	0.63%
	Consumer Durables & Apparel	0.63%
	Consumer Services	0.51%
	Media	1.53%
	Retailing	0.83%
Consumer Staples	Food & Staples Retailing	3.31%
	Food, Beverage & Tobacco	0.93%
	Household & Personal Products	0.00%
Energy	Energy	26.58%
Financials	Banks	19.33%
	Diversified Financials	2.05%
	Insurance	5.36%
	Real Estate	2.84%
Health Care	Health Care Equipment & Services	0.00%
	Pharmaceuticals, Biotechnology & Life Sciences	1.00%
Industrials	Capital Goods	1.78%
	Commercial &Professional Service	0.49%
	Transportation	3.65%
Information Technology	Semiconductors & Semiconductor Equipment	0.00%
	Software & Services	0.68%
	Technology Hardware & Equipment	0.71%
Materials	Materials	18.24%
Telecommunication Services	Telecommunication Services	6.80%
Utilities	Utilities	2.12%

Source: S&P Capital IQ. Data as of Dec 31, 2011.

Given this imbalance in industry representation and to ensure a more reasonable representation within each industry (as a fraction of total market capitalization), we use a customized industry group considering both the GICS map as well as the market capitalization distribution. Tables 3 shows the 17 customized industry group definitions we have used. The groups are in different levels of GICS map. For example, the Gold group is at GICS level 4 (sub-industry) and the Utilities group is at GICS level 1 (sector). Some groups are combination of different GICS levels. This customized group division scheme based on market cap distribution is desirable for countries with industry structures that do not conform to the standard GICS structure[1].

Table 3: Customized Industry Groups of Canada Risk Model

Group Name	Definition (GICS Map Name and Corresponding Code)	Market Cap
Banks	Banks(4010)	19.33%
Chemicals & Other Materials	Material (15) Excluding Metals & Mining(151040)	2.46%
Consumer Discretionary	Consumer Discretionary(25)	4.13%
Consumer Staples	Consumer Staples(30)	4.24%
Diversified Financials	Diversified Financials(4020)	2.05%
Energy Transportation & Services	Energy(1010) Excluding Oil & Gas Exploration & Production (10102020) and Integrated Oil & Gas(10102010)	4.71%
Gold	Gold(15104030)	10.26%
Health Care	Health Care(35)	1.00%
Industrials	Industrials(20)	5.92%
Information Technology	Information Technology(45)	1.39%
Insurance	Insurance(4030)	5.36%
Integrated Oil & Gas	Integrated Oil & Gas(10102010)	7.79%
Metals & Mining ex. Gold	Metals & Mining (151040) excluding Gold(15104030)	5.00%
Oil & Gas Exploration & Production	Oil & Gas Exploration & Production (10102020)	12.08%
Real Estate	Real Estate(4040)	5.36%
Telecommunication Services	Telecommunication Services(50)	6.80%
Utilities	Utilities(55)	2.12%

Source: S&P Capital IQ. Data as of Dec 31, 2011.

[1] See Pg 60 in Grinold and Kahn (1999)

2 Risk Model Testing

We used a set of benchmark and test portfolios, given in Table 4, to evaluate the performance of our Canada risk model. In the table below, the portfolios in the "TSX" group all have history from 2002 and the two portfolios in the "Test" group have history from 1997 through 2011. The large (small) cap portfolio in the "Test" group is an equal weighted portfolio constructed by taking the top (bottom) half of the stocks of the estimation universe ordered by market capitalization.

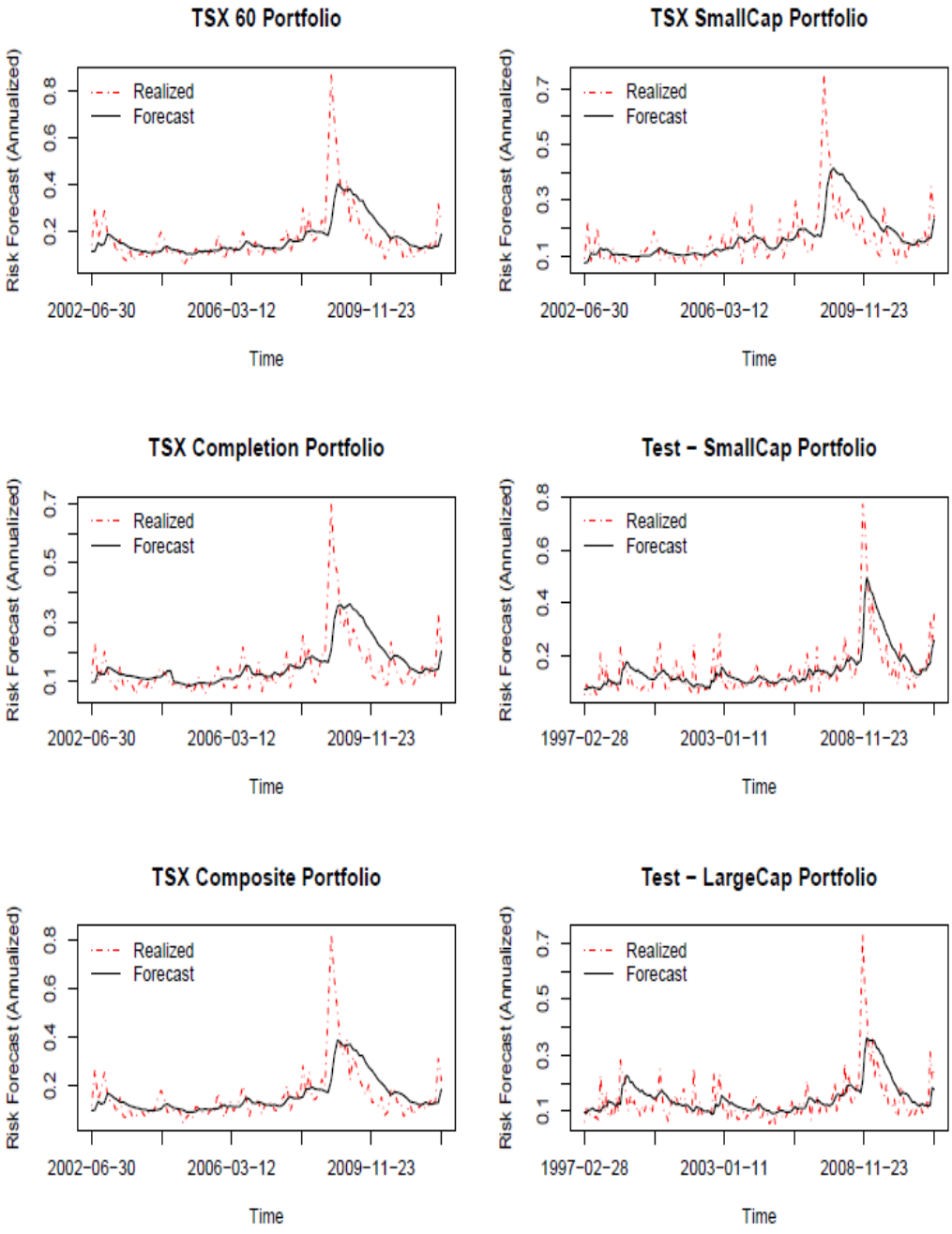
Table 4: Canada Test Portfolios

	PORTFOLIO	Group
1	S&P/TSX 60	TSX
2	S&P/TSX Completion	TSX
3	S&P/TSX Composite	TSX
4	S&P/TSX SmallCap	TSX
5	Test – SmallCap	Test
6	Test – LargeCap	Test

Source: S&P Capital IQ

The Canada model uses Canadian Dollar as the base currency and the test portfolio risks are also calculated from portfolio returns denominated in the same currency. Figure 3 below shows time series plots of the forecast and realized risk of the test portfolios using our Canada Risk Model.

Figure 3: Comparisons of Forecast and Realized Risks for Test Portfolios



Source: S&P Capital IQ. Data ending Dec 31, 2011.

The widely used bias test looks for bias in risk model forecasts. A risk model is said to be unbiased if forecasts neither consistently under- or overestimate realized volatility. We use the same bias test statistic defined in our US equity risk model whitepaper (Scherer et al, 2010). A bias test statistic larger (smaller) than unity indicates that the risk model underestimates (overestimates) risk. Table 5 reports the bias test statistics of the test portfolios for our Canada Risk Model. For comparison, the bias test statistics for Global Risk Model are also presented[2] . It shows that our Canada risk model achieves an overall bias statistic close to 1.0 for all test portfolios. For all portfolios, the bias statistics are within 95% confidence interval around the expected bias statistic value of 1.

Table 5: Model Bias Statistics across Test Portfolios

Portfolio	Bias Statistics	
	Canada	Global
S&P/TSX 60	1.032	0.972
S&P/TSX Completion	0.964	0.958
S&P/TSX Composite	1.014	0.954
S&P/TSX SmallCap	1.015	0.979
Test – SmallCap	1.004	0.958
Test – LargeCap	0.970	0.946

Source: S&P Capital IQ. Data ending Dec 31, 2011.

Table 6 below shows the performance comparisons of the Canada model and Global model using the Diebold-Mariano (DM) Test t-statistic across the test portfolios (with both Mean Squared Error-MSE and Mean Absolute Error-MAE loss functions). Since the DM test compares one model to another we used our Global Risk Model as the base model[2]. Both MSE and MAE metrics show that the Canada risk model achieves improved performance over Global model and the MAE results are statistically significant at the 95% confidence level.

Table 6: DM statistics of Canada Models Compared to Global Risk Model

Portfolio	Loss Function (t-statistic)	
	MSE	MAE
S&P/TSX 60	0.683	3.780
S&P/TSX Completion	1.004	2.438
S&P/TSX Composite	0.779	3.882
S&P/TSX SmallCap	1.115	2.133
Test – SmallCap	0.451	2.835
Test – LargeCap	1.462	3.799

[2] For the global model (base currency USD) we turned off translation risk and measured everything in local currency which is CAD for the stocks in the test portfolios to make a fair comparison.

Source: S&P Capital IQ. Data ending Dec 31, 2011.

3 Risk Model Relevance

We venture to demonstrate the effectiveness and relevance of our Canada risk model by looking at the industry attributions of some concentrated industry portfolios. These sample portfolios were constructed by equally weighing stocks from the Canada region grouped according to their GICS classification. We picked a few of the top names (by market cap) within the corresponding industries for each sample portfolio. Table 7 gives details on these sample portfolios.

Table 7: Sample Canadian Industry Portfolios

Portfolio	Equal Weighted Constituents
Banks	BANK OF MONTREAL ROYAL BANK OF CANADA TORONTO DOMINION BANK BANK OF NOVA SCOTIA
Oil and Gas Exploration	NEXEN INC CANADIAN NATURAL RESOURCES ENCANA CORP TALISMAN ENERGY INC
Real Estate	H&R REAL ESTATE INVT TR BROOKFIELD ASSET MANAGEMENT(BAM.A) BROOKFIELD OFFICE PPTYS INC BROOKFIELD ASSET MANAGEMENT (BAM.PC)
Utilities	BROOKFIELD RNWBL ENERGY CANADIAN UTILITIES (CU.X) FORTIS INC CANADIAN UTILITIES (CU.)

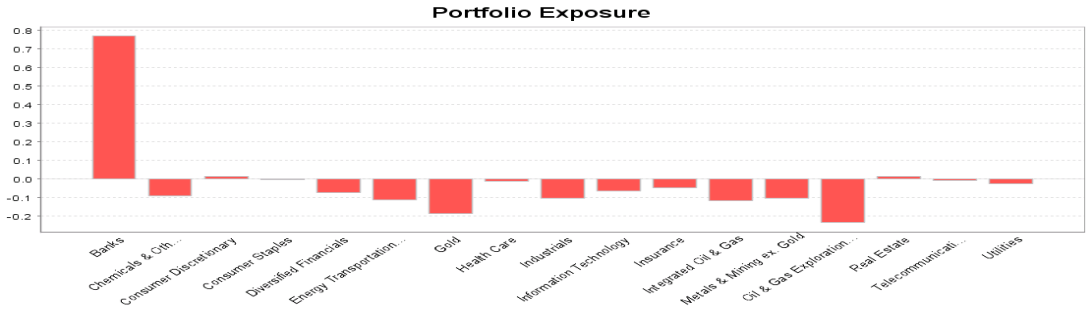
Source: S&P Capital IQ

Figure 4 shows the industry exposures of the Canada Bank portfolio. The top sub-panel shows exposures using Canada risk model and the bottom sub-panel shows industry exposures using the Global risk model for Dec 2011. The charts for the other portfolios specified in Table 7 are included in Figure 5, Figure 6 and Figure 7.

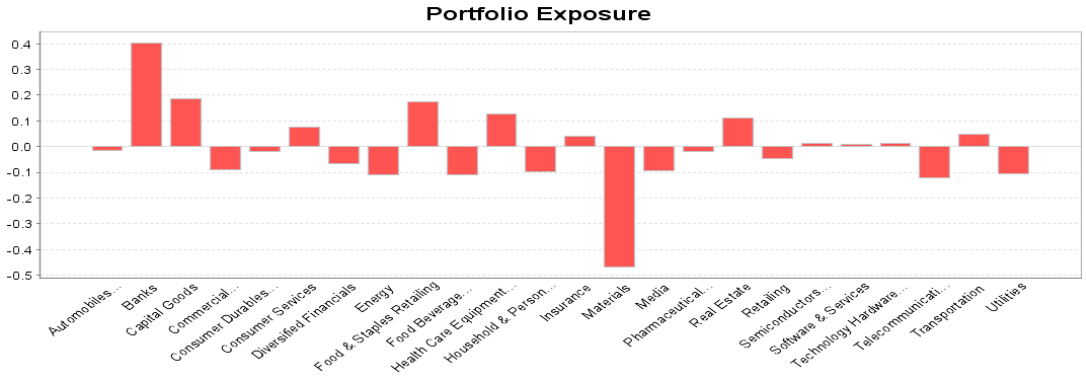
In Figure 4, both models show a high exposure to bank industry, as one would expect. However, the Canada risk model shows much more muted exposures to the other industries as compared to the global model. Thus the Canada risk model produces more accurate and intuitive overall industry exposures compared to the global model.

Figure 4: Industry Exposures of Canada Bank Portfolio

(a) Industry exposures using the Canada model



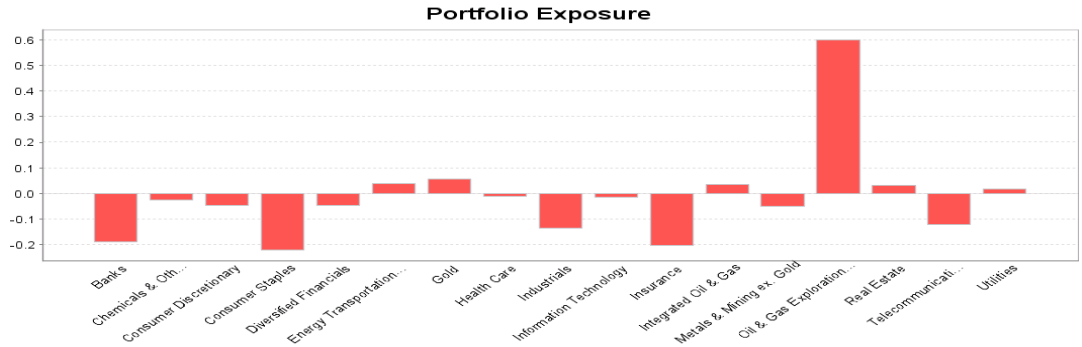
(b) Industry exposures using the Global model



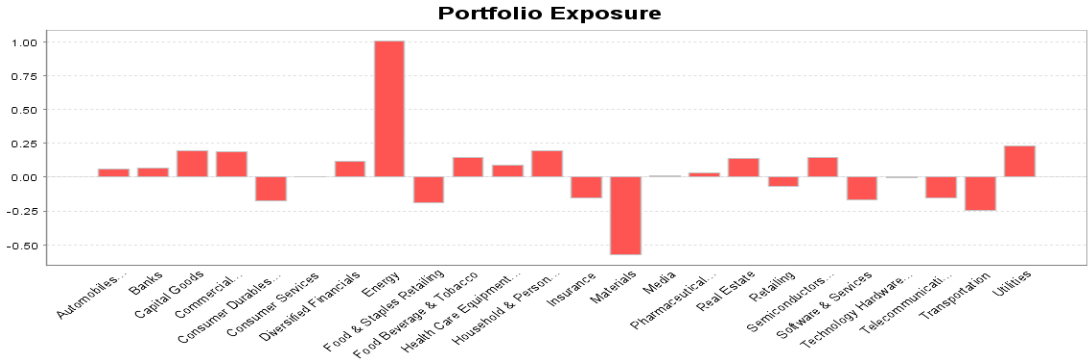
Source: S&P Capital IQ. December 2011. Charts are provided for illustrative purposes only.

Figure 5: Industry Exposures of Canada Oil and Gas Exploration Portfolio

(a) Industry exposures using the Canada model



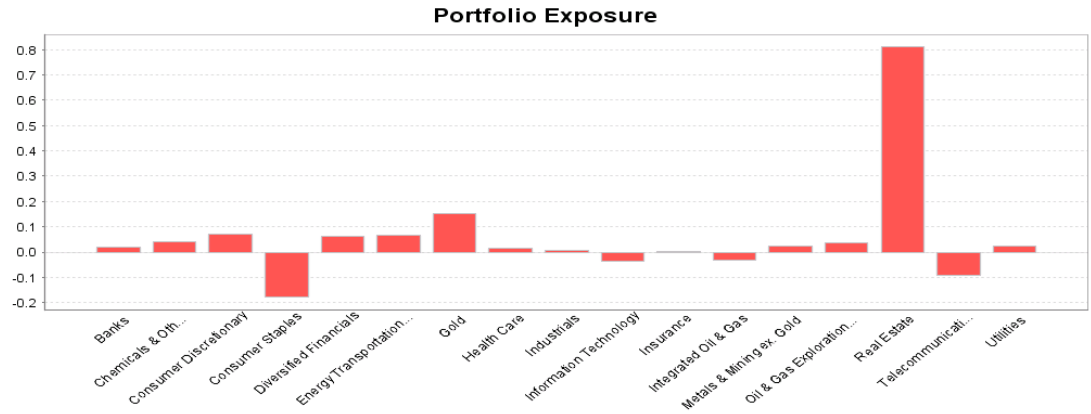
(b) Industry exposures using the Global model



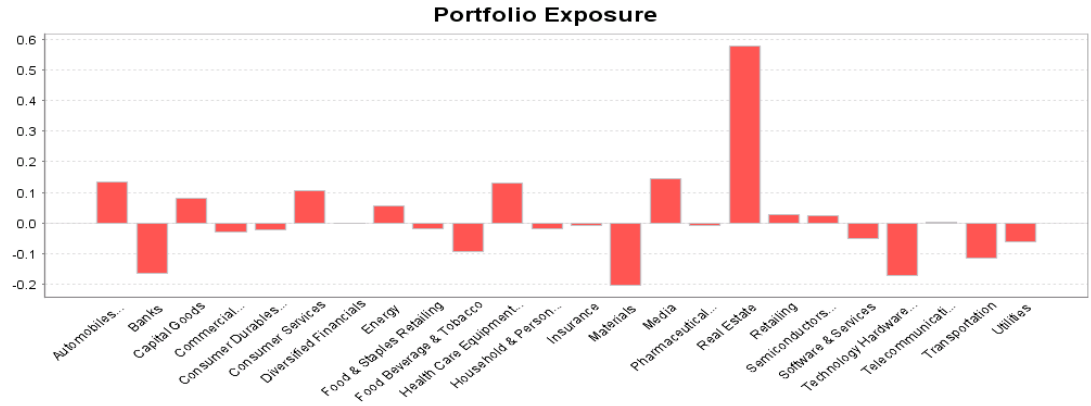
Source: S&P Capital IQ. December 2011. Charts are provided for illustrative purposes only.

Figure 6: Industry Exposures of Canada Real Estate Portfolio

(a) Industry exposures using the Canada model



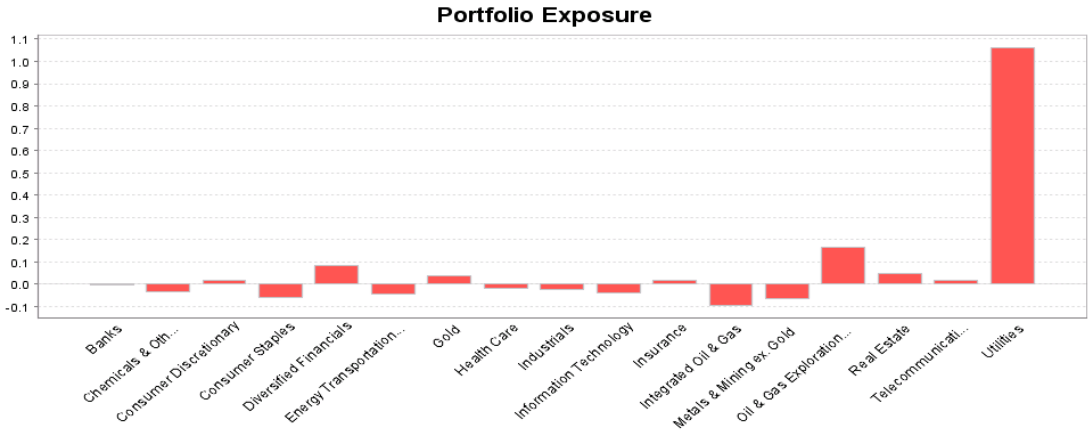
(b) Industry exposures using the Global model



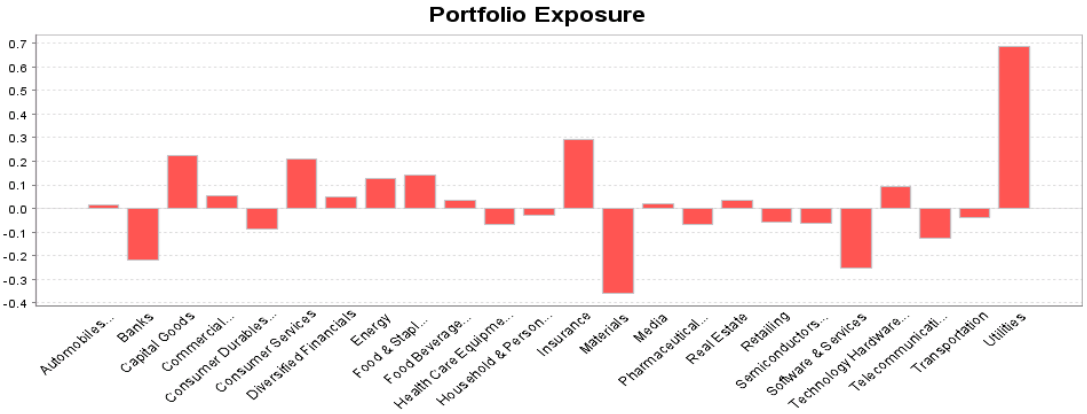
Source: S&P Capital IQ. December 2011. Charts are provided for illustrative purposes only.

Figure 7: Industry Exposures of Canada Utilities Portfolio

(a) Industry exposures using the Canada model



(b) Industry exposures using the Global model



Source: S&P Capital IQ. December 2011. Charts are provided for illustrative purposes only.

As in our regional risk model whitepaper [Balachander et al, 2012], we capture this effect through a normalized concentration value, $\mathrm{CV} = (x_{own}^2 / \sum_{i \in \text{sectors}} x_i^2)$ where x_i represents the exposure to the i-th sector. A value closer to 1 would indicate that the model produced attribution has higher exposures to the expected industry relative to others.

Table 8 lists the concentration values of the 4 sample portfolios. Again as expected, the Canada risk model generates higher concentration values compared to the global model which shows that Canada model provides more relevant risk attribution.

Table 8: Industry Exposure Concentration Values for Different Canada Portfolios

Industry	Exposure Concentration Value	
	Canada	Global
Bank	79.2%	27.1%
Oil and Gas Exploration	68.6%	57.0%
Real Estate	90.0%	59.4%
Utilities	94.8%	47.5%

Source: S&P Capital IQ. Dec 2011

4 Conclusions

In this paper we have introduced our Canada equity fundamental time series risk model. We described the basic methodology and summarized the salient aspects of constructing the model. We have presented the results of testing the Canada risk model out of sample and highlighted the advantage of using a country specific model for Canada equity portfolios.

For more information on the Capital IQ Equity Risk Models please contact Ruben Falk at rfalk@spcapitaliq.com.

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Our Recent Research

September 2012: Earnings Announcement Return – Is A Return Based Surprise Superior to an Earnings Based Surprise?
Earnings surprise strategies have been popular amongst investors ever since Ball and Brown (1968) documented the drift in security prices subsequent to company earnings announcements. One of the most widely used surprise stock picking strategy is based on the standardized difference between a company's actual and expected earnings (SUE). In this report, we compare the performance of SUE to one based on returns around a firm's earnings announcement date (EAR), proposed by Brandt et al (2008). We test both factors globally and find:
· EAR dominates SUE in the U.S in the post Reg FD era on both a long-short return and top quintile excess return basis.
· In the U.S, EAR performance is not subsumed by price momentum.
· SUE's performance is subsumed by EAR's in Canada.
· EAR's long-short spread is statistically significant in all four markets we tested outside North America – UK, Japan, Australia and Europe ex UK, while SUE shows efficacy in only the latter two markets.
· Style is important for firms with weak EARs.

August 2012: Supply Chain Interactions Part 1: Industries – Profiting from Lead-Lag Industry Relationships
Material events affecting entities in an economic system should introduce ripple effects to related entities through various types of relationships. Supply chain relationships are among the most visible and measurable, as revenues and costs shape the realized economic and financial performance of connected companies. Studies have shown that events within a supply chain do introduce these ripple effects, and theories incorporating this information into an investment process have garnered attention in recent years. Leveraging input-output accounts from the BEA and Compustat, which use North American Industry Classification System (NAICS) Codes, we construct a map quantifying industry level connections along the supply chain. Using this map, and trailing industry returns as a proxy for industry level information shocks, we construct inter-industry momentum signals similar to the methodology proposed by Menzly and Ozbas. These signals exhibit lead-lag relationships over short horizons, as the information shocks diffuse through the market and manifest themselves in the performance of related industries.

July 2012: Releasing S&P Capital IQ's Regional and Updated Global & US Equity Risk Models
Over the course of the last two years we released our Global and US Fundamental Equity Risk Models. As a natural progression we are releasing the first set of Regional Models -- the Pan-Asia ex. Japan and the Pan-Europe Fundamental Equity Risk Models. This document will explain some of the salient aspects of the process adopted for constructing the Regional Models. We have also made additional improvements to our US & Global Equity Risk Models, and we shall explain these changes.

June 2012: Riding Industry Momentum – Enhancing the Residual Reversal Factor
Unlike individual stocks whose short-term returns tend to revert from one month to the next, industry portfolios exhibit return momentum even at a one-month horizon. We examine a strategy that takes advantage of both industry level momentum and stock level reversal. We combine our residual reversal factor with an industry momentum score, and find that the factor performance is greatly enhanced in the Russell 3000 universe between January 1987 and February 2012. The decile return spread is increased by 42 bps per month on average.

May 2012: The Oil & Gas Industry - Drilling for Alpha Using Global Point-in-Time Industry Data
In the oil & gas industry, a key determinant of value and future cash flow streams is the level of oil & gas reserves a firm holds. While most fundamental analysts/investors take into consideration a company's reserves in arriving at price targets, a majority of systematic driven processes do not. Using S&P Capital IQ's Global Point-in-Time database, we investigate the importance of reserve and production information provided by oil & gas companies.

May 2012: Case Study: S&P Capital IQ – The Platform for Investment Decisions
Ten years ago, AAPL traded just below $12 and closed at $583.98 on April 30, 2012. That is an average annual return of 48.1% over the period. During this same time the S&P 500 grew at an annual rate of only 2.65%. On April 2nd, Topeka Capital Markets initiated coverage of AAPL with a price target of $1001. If achieved, this would make AAPL the first company to ever reach a $1 trillion market cap. In this case study, we highlight some key S&P Capital IQ functionality in analyzing AAPL hypothetically reaching $1000:

March 2012: Exploring Alpha from the Securities Lending Marker – New Alpha Stemming from Improved Data
Numerous studies have examined the information content of short interest and found that heavily shorted stocks tend to underperform and liquid stocks with low levels of short interest subsequently outperform. Most studies relied on short interest data obtained directly from the exchanges available with a significant delay.

January 2012: S&P Capital IQ Stock Selection Model Review – Understanding the Drivers of Performance in 2011
In this report, we review the performance of S&P CIQ's four U.S stock selection models in 2011. These models were launched in January 2011, and this analysis will assess the underlying drivers of each model's performance over the last 12 months.

January 2012: Intelligent Estimates – A Superior Model of Earnings Surprise
As residual stakeholders, equity investors place enormous importance on a company's earnings. Analysts regularly forecast companies' future earnings. The prospects for a company's future earnings then become the basis for the price an investor will pay for a company's shares. Market participants follow sell side analysts' forecasts closely, identifying those analysts that demonstrate forecasting prowess and track those analysts' forecasts going forward.

December 2011: Factor Insight – Residual Reversal
Many investors employ price reversal strategies (strategies that buy "losers" and sell "winners" based on short-term price changes) in their stock selection decisions. One popular reversal strategy is constructed as the change in 1-month stock price over the most recent month. This report compares the performance of this factor to a "residual reversal" signal proposed by Blitz, Huij, Lansdorp and Verbeek in their 2011 paper, "Short-Term Residual Reversal".

November 2011: Research Brief: Return Correlation and Dispersion – All or Nothing

October 2011: The Banking Industry

Investors can improve model and portfolio risk adjusted returns using various approaches, including incorporating new alpha signals in an existing investment process. In this research piece, we build on our earlier work (See "Is your Bank Under Stress? Introducing our Dynamic Bank Model", November 2010), to determine if bank specific data provided by financial institutions regulatory bodies (FFIEC standardized data), can yield alpha signals orthogonal to those found in most stock selection models.

September 2011: Methods in Dynamic Weighting
In this report, we introduce a powerful discovery tool in Alphaworks and provide a pragmatic survey covering the identification and potential dynamic techniques to handle financial regimes and security level context. With increasingly volatile factor performance, the ability to implement adaptive strategies is paramount in maximizing factor efficacy.

September 2011: Research Brief: Return Correlation and Dispersion - Tough Times for Active Managers

July 2011: Research Briefs- 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