

Quantitative Value Strategy Beats the Market

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Abstract

The objective of this paper is to test if Quantitative Value Strategy works in Canadian market. Combining different value investment strategies from researchers and industry pioneers, a slightly revised existing strategy is used to back-test historical returns in the Canadian stock market. All the value strategies, commonly used by others, are small deviations from three main strategies mentioned in the literature review.

In order to identify stocks that have greater intrinsic value but at cheap prices, numerous ratios have been used in the screening process. There are main three steps for identifying the wanted stocks. First of all, eliminate all stocks with high possible earning manipulations. Next, identify cheap stocks using various financial ratios. Lastly, find the best quality stocks. Rankings are based on prior year-end financial data collected from Bloomberg.

A long-short strategy is applied with one hundred twenty percent long and twenty percent in short positions. Based on prior year-end market capitalization, weights are assigned to each selected stocks. Once the portfolio is formed, these securities follow buy-and-hold strategy until the next rebalance cycle, which is the following year end.

After back-testing ten-year data from 2002 to 2012, the 120/20 portfolio annualized return is 11.53%, which is 4.92% higher than the annual SP/TSX index return. When looking at the returns alone, the constructed portfolio does outperform; however, the excess return is not risk adjusted as indicated in

regression test. The value strategy is able to beat the market, but the excess returns mainly come from excess risks that the strategy has been taken. After risk adjustment, the constructed portfolio no longer beats the market; in other words, the famous value strategy fails to beat the market after taking consideration of risk factors.

Moreover, there are several potential implementation issues that could erode the performance return, such as transaction costs, dividend reinvestment and look-ahead issue. Also, some financial behaviors are observed to prevent from beating the benchmark returns.

Literature Review

Value Investment Strategy

Based on value investor's bible "Security Analysis", written by Benjamin Graham in 1934, value investing strategy is to look at financial statements logically or empirically. Logical argument states that investors should invest only if the intrinsic value of the stocks is greater than the market value. On the other hand, empirical argument says that historical ratios can be a good indication for selecting stocks (Graham and Dodd).

Also, value investing strategy is supported by many researchers such as: Eugene Fama and Ken French and contrarian supporters.

40 years after Graham's publication of his book "Security Analysis", he started to use a simplified portfolio approach that relied on portfolio returns rather than

individual stock returns as he thinks the new strategy is logical, easy to apply and delivers good performance. Graham's new rules to follow for the simplified portfolio approach:

- Hold only thirty stocks
- Invest stocks with Price to Earnings ratio smaller than 10
- Invest stocks in Debt to Equity ratio greater than fifty percent
- Hold stocks until fifty percent return and then liquidate
- Sell stocks regardless if fifty percent return does not reach two years from the initial investment
- Invest and follow the strategy for more than five years

Magic Formula

The Magic Formula is a derivative product of Warren Buffet's observation that it is "far better to buy a wonderful company at a fair price than a fair company at a wonderful price." Then Greenblatt quantitatively defined "good investment" and a "bargain price" (Greenblatt).

The first criterion is to find "good investment," and ROC is used for screening good investments. ROC is calculated using Earnings before Interest and Tax (EBIT) divided by sum of Property, Plant and Equipment (PP&E) and Working Capital (WC). ROC measures the efficiencies of management using capital and the higher the number, the higher returns for each dollar spent in capital, in other words, better investment.

Another part of the Magic Formula is to select stocks with bargain price. Greenblatt uses earning yield, which is calculated by dividing EBIT by Total Enterprise Value (TEV). The higher earning yield, the better bargain price the stock has.

$TEV = \text{market capitalization} + \text{debt} - \text{excess cash}^* + \text{preferred shares} + \text{minority interests}$

**Excess cash = cash + current asset - current liability*

Greenblatt has tested that the top 30 stocks according to his Magic Formula would have generated 30.8% per year from 1988 to 2004.

Quality and Price

Robert Novy-Marx, a Finance professor at Simon Graduate School of Business, refined the Magic Formula by replacing ROC with “quality and price” in order to further improve performance (Robert Novy-Marx). Gross Profitability to total assets (GPA) is used to replace ROC and is calculated by dividing gross profit by total asset. According to Novy-Marx, gross profit is the “cleanest measure of true economic profitability”, and total asset is used here due to its irrelevance of capital structure. The higher GPA means the better quality of a stock.

Book value-to-market capitalization (BM) is used to identify stocks with bargain price. BM equals to book value divided by market value. BM is preferred due to its nature of less volatility from period to period, comparing other measures that involve items from income statement, such as earning yield from the Magic Formula. The higher BM indicates better bargain price.

Strategy

As described in the literature review, value strategies can be based on various ratios and each of them will have different impacts on portfolio returns. All the studies mentioned in the literature review are based on securities in the US stock market. The purpose of this paper is not to test which strategy is better, but to test how the Quantitative Value Strategy specified in the implementation steps works in the Canadian stock market.

The quantitative value strategy used in this paper is also based on two key aspects: “Good investment” at “bargain price,” but different ratios are used and are discussed in great details in section implementation steps.

Most of test results of above strategies hold one hundred percent long stocks. In this paper, a long-short hedging strategy is introduced with one hundred twenty percent in long stocks and twenty percent in short stocks. In order to amplify the portfolio returns, the bottom stocks are shorted when constructing portfolio. This long-short strategy is compared with one hundred percent long portfolio, and it indicates that long-short strategy has better returns.

The strategy criteria give specific rankings for each security from the best to the worst, and more details are explained in the implementation steps. The stocks on the top of the list are considered as better investments with bargain price comparing to the stock on the bottom of the ranking list; therefore, the top stocks

should be purchased. On the other hand, the stocks on the bottom are less attractive stocks due to either low intrinsic values or high price or both.

Behavioral Finance Influence

Behavioral finance researchers think that most investors behave irrationally when it comes to decision making about the right timing for buying and selling stocks. Following strict rules or disciplines is very important in terms of managing money. Probably one of the most challenging tasks is to remain calm when anyone sees the stocks dropping value significantly in the portfolio. Some of the common biases that influencing investors' thinking are listed below.

Self-attribution bias and hindsight bias could cause irrational behaviors as suggested by behavioral finance field pioneers. Self-attribution refers to investors tend to think it is due to one's ability when it comes to success; however, blame someone else when failures happen. In this case, when market is up and doing well, investors tend to think it's due to their own judgments. But when the performance is not ideal, it is due to market crash or model failure. Hindsight bias is also known as the knew-it-all effect. This can lead to unreasonable prediction when investors think they are able to predict better than they actually can. To avoid these biases, strictly following the investment strategy is essential.

Also, many investors think fancy models are more advanced and therefore give better results. However, simple models outperform expertise opinions supported by psychologists, Graham, and many other behavioral finance theory

supporters. All in all, following a simple and easy to follow strategy is more likely to avoid above biases and provide better investment results.

Implementation steps

Step 1: Eliminate Stocks with Earning Manipulations

Due to the analysis is heavily based on financial statements, adjustments need to be made to avoid any earning manipulations or fraud, which have been seen many cases in the real world. For example, in Enron scandal, the untruthful presentation in their financial statements caused the bankruptcy of the company and its shareholders have lost nearly 11 billion in one and half year.

Without adjustments and better understanding of the financial statements, the outcome will simply be incorrect, and it will lead to undesirable returns. According to the famous article from professor Richard Sloan “Do stocks fully reflect information in accruals and cash flows about future earnings,” the stocks selected by using the earning quality measures perform exceptional well comparing to low quality stocks. Below is one measure that is used commonly to determine if potential earning manipulations exist:

Cash Flow based aggregate Accruals (CFA) = (Net income – CFO – CFI)

Cash Flow based aggregate Accruals Ratio (CFAR) = CFA/ average value of Net Operating Asset (NOA)

NOA = total asset – cash – (total liabilities – total long term debt)

By applying this simple earning quality measure, one can separate good quality companies and bad ones. The higher the CFAR is, the lower quality of the

stock and the worse the returns will be in the long run. Although CFAR has shortfalls of identifying which areas of manipulations come from, it does a good job distinguishing bad and good companies. The purpose of this test in this paper is not to look into the areas earning manipulations, but to screen out stocks with bad scores (i.e. High CFAR)

Managements have many incentives to manipulate the financial statements and therefore, it is crucial to eliminate stocks with the lowest earning quality. Eliminate all the firms in the top 10 percent of sample based on CFAR. In “Value Strategy,” a more complicated screener is used for identifying low earning quality securities, and this strategy eliminates bottom ten percent worse stocks. Therefore, 10 percent is applied here to be consistent with existing strategies.

Step 2: Identify Cheapest Stocks

The second thing in the implementation is to find the cheapest stocks after eliminating low earning quality companies. As previously mentioned in the literature review, Greenblatt has tested that top 30 stocks according to the magic formula would have generated 30.8% per year from 1988 to 2004. Magic formula uses earning yield as a relative price for a stock.

- Earning yield = $EBIT/TEV$

- $TEV = \text{market capitalization} + \text{total debt} - \text{excess cash} + \text{preferred shares} + \text{minority interests}$
- $\text{Excess cash} = \text{cash} + \text{current asset} - \text{current liability}$

Earning yield is analogous to earning-to-price ratio, which is commonly used to measure the fair value of a stock. After calculating the earning yields, stocks are ranked based on earning yields from highest to the lowest. The stock with the highest earning yield (i.e. the cheapest) will have ranking of 1 and the lowest earning yield will have the largest value.

Step 3: Identify Stocks with Highest Quality

After determining the cheapest stocks, “good investments” need to be identified based on Warren Buffet’s value strategy. According to “Quantitative Value,” there are two essential major factors to identify a sound investment.

First of all, Buffet always believes in that great values exist in Franchise brand names as he thinks there are hidden values in these brand names, so the first factor is Franchise Power. This factor is to determine how much return on investments and growth over the past years.

Franchise power = average (ROA Percentile, FCFA Percentile)

- 5 year ROA = Five-Year Return on Assets (based on Geometric calculation)
 - $ROA = NI \text{ before extraordinary items} / \text{Total Asset}$
 - ROA Percentile (from highest to the lowest)
- Long-Term Free Cash Flow on Assets (FCFA)
 - Sum of 5 year FCF/Total assets
 - FCFA percentile sorted from the highest to the lowest

Financial strength is another important factor to consider when to determine how good one company is doing. Financial strength includes profitability, stability and operational results as listed below.

Financial Strength = $\text{sum (ROA Score, FCFTA Score, Accrual Score, Leverage Score, Liquidity Score, YOYROA Score, YOY Margin Score, YOY Turnover Score)}/10$

- Current Profitability
 - Return On Asset Score (1 when $ROA > 0$; 0 otherwise)
 - $ROA = NI \text{ before extraordinary items} / \text{Total Asset}$
 - Free Cash Flow/Total Asset Score (1 when $FCFTA > 0$; 0 otherwise)
 - Accrual Score (1 when $Accrual > 0$; 0 otherwise)
 - $Accrual = FCFTA - ROA$
- Financial stability
 - Leverage Score (1 when $Leverage > 0$, 0 otherwise)
 - $Leverage = \text{long-term debt (t-1)} / \text{total assets (t-1)} - \text{long-term debt (t)} / \text{total assets (t)}$

- Liquidity Score (1 when Liquidity > 0; 0 otherwise)
 - Liquidity = current ratio (t) – current ratio (t-1)
- Recent Operational Improvements
 - YOYROA Score (1 when YOYROA > 0; 0 otherwise)
 - YOYROA = Year-over-year change in ROA
 - YOY FCFTA Score (1 when YOY FCFTA > 0; 0 otherwise)
 - YOY FCFTA = Year-over-year change in free-cash-flow to the firm
 - YOY Margin Score (1 when YOY Margin > 0; 0 otherwise)
 - YOY Margin = Year-over-year change in gross margin
 - YOY Turnover Score (1 when YOY Turnover > 0; 0 otherwise)
 - YOY Turnover = Year-over-year change in asset turnover

Step 4: Rank Stocks According to Ratios and Assign Weights Based on Market Capitalization Weighting

- Rank Cash Flow based aggregate Accrual Ratio (CFAR) from the smallest to largest, and then eliminate all the firms in the top 10 percent of sample based on CFAR
- Rank Earning yield from the highest to the lowest and give rank 1 to the highest value
- Rank Franchise Power from the smallest to the largest and give rank 1 to the smallest value

- Rank Financial Strength from the smallest to the largest and give rank 1 to the smallest value
- Calculate Quality Value by taking average of Franchise Power value and Financial Strength value
- Take average of Earning yield and Quality Value
- Long the top 36 stocks from the overall ranking and short the bottom 6 stocks

Step 5: Assign Weights

After selecting the stocks based on rankings, weights are assigned based on market capitalization as of December 31st from the previous year. The reason to use market capitalization weights is that it is more comparable with the benchmark SP/TSX, which is a capitalization-weighted index. Total market capitalization is calculated by summing up all thirty-six long stocks' market cap, and individual stock weight is 1.2 times of its own market cap over total market capitalization. Based on Graham's value investment strategy, only thirty stocks are selected to form a portfolio. Due to in this paper a long-short strategy with 20% short position is used, twenty percent which is equivalent to six securities are shorted, and additional six long securities to offset the short positions. 120/20 rule is used to amply the portfolio returns without taking too much downturn risks. For the short stocks, the weights are based on 20% of its own weights. The total weights for six short stocks are negative twenty percent, and the weights for thirty-six long stocks are positive

one hundred twenty percent. This leads to one hundred percent in aggregate for the entire portfolio.

Step 6: Rebalance

Rebalance is conducted annually as of each December 31st.

At each year-end, the financial statements are downloaded, ratios are updated, and a new list of stocks is selected based on the same criteria. The rule of thumb is that no matter how good the stock has been performing, if the stock is no longer in the top list, it has to be liquidated according to the investment implementation plan described earlier. Difficulties of following this rule will be explained in behavioral finance influence section in more details.

Step 7: Calculate Performance

Due to the rebalance frequency is annual, the implication is that the stocks are held until next rebalance time. Since it is basically a buy-and-hold strategy for each year, to simplify the calculation, year-end stock prices are collected from Bloomberg and used for calculating capital gains. Annual dividend yields are also downloaded from Bloomberg and weighted by market capitalizations to calculate the dividend income. The aggregate annual performance combines both capital gains and dividend incomes for each year.

After each year's performance is calculated, the aggregate ten-year performance is compounded.

Benchmark Selection

Since the objective of this study is to test how Quantitative Value Strategy beats the Canadian market, the stocks selected from previous criteria, are all listed in Canadian market, the S&P/Toronto Stock Exchange Composite Index is used to compare returns.

SP/TSX is a capitalization-weighted index, which is designed to be a proxy of Canadian stock market activities. The constructed portfolio is also composed based on market capitalization, so this way, it is more comparable between the portfolio and the benchmark.

Based on PricewaterhouseCoopers (PwC) survey, more than 60 IPOs are introduced to Canadian Stock Exchange for the past three years. See Appendix E for past three year data. Also, many stocks get delisted due to many reasons such as violating regulations or failing to meet financial specifications set out by stock exchange and etc. This means that the benchmark SP/TSX has updated list whenever there is IPO or delisting.

This is challenging to keep track of historical security in and out from the index, and extremely difficult to calculate the index return based on changing security list. Luckily, Bloomberg keeps track of security list at any given point, and it improves great efficiencies to calculate the benchmark returns.

Potential issues

Transaction Costs Bias

Problem

Transaction costs are incurred when conducting trades, both purchasing and selling. Due to the portfolio is a rebalanced based on changing financial ratios, the portfolio incurs large amount of transaction fees, but these are not included anywhere in the analysis. This zero transaction cost assumption under the analysis can introduce great errors into the testing results. Even if it is an annually rebalance portfolio, turnover of stocks can be extremely high. See Appendix B for historical turnover ratios calculated based on annual rebalance list, and in 2010 the turnover reached 88%, which is more likely incur high transaction cost.

Correction

Investment simulations should take rebalancing transaction costs into consideration. It is possible that the transaction costs are higher than the excess expected return of the portfolio. Based on industry standard, an estimated fee should be applied to each trade when each transaction occurs. Due to the limited resources and time, this paper does not include the transaction fee adjusted performance.

Look-Ahead Bias

Problem

Look-ahead bias is related to data inclusion when data selected are not available yet. Annual financial statements usually are not available on December 31st, but a few months afterwards. This paper is based on data collected as of December 31st, and some of the values are not necessarily year-end. This may misstate the expected returns of the portfolio.

Correction

When collecting data, the actual year-end values should be considered into stock screening process. However, there are some difficulties to achieve this goal. First of all, every company has different year-end, so that it is hard to use a single “point-in-time” to evaluate all the companies. Also, it is hard to estimate the time for all financial statements come out. Lastly, it is very time consuming to adjust all the data by checking each company’s financial statements release date manually. This process can be automated to reduce the manual checking time and efforts. This is an issue for ongoing rebalances as financial statements will not come out as prior year end, but usually two to three months afterwards. The objective of this paper is to back-test the strategy, in order to correct this bias, March 31st values are used instead of December 31st. As indicated in Appendix C3 and C4, the excess returns are both improved. This means that after adjust look-ahead bias, the performance of the constructed portfolio is enhanced.

Dividend Underestimate Bias

Problem

Investment return should include both capital gains and dividend payments. However, prices downloaded from Bloomberg do not take dividend payments into considerations. Therefore, the portfolio performance is way underestimated, especially when the dividend yields are high such as during the period of 2008 and 2009. See appendix A for dividend yield chart for historical years.

Correction

Individual stocks pay dividends at different dates and with different frequencies. Due to the test results are based on historical data, all the dividend information is known for all past ten years from 2002 and 2012. In order to take the dividend incomes into consideration, dividend yields are included in the part of performance calculation as explained previously. However, for future rebalance, adjusted prices should be used instead of last close price in order to make performance more comparable.

Test results

After back-testing data from 2003 to 2012, the 120/20 portfolio annualized return is 14.22%, while the benchmark annualized return is 9.12%. This is equivalent to approximate five percent excess return for each year. Assume the

initial value is \$100, and after ten years of rebalancing according to the strategy, the portfolio value is \$378 in return. The highest excess annual return was 31.12% in 2005, and the lowest return was -12.66% in 2011. On the other hand, the 100% long portfolio only has 0.93% excess annual return comparing to the same benchmark. This confirms that with long-short hedging strategy, the portfolio returns are amplified. See details comparison between two strategies in Appendix C1, C2 and Appendix D.

An investment strategy has limited ongoing buying and selling actions with intention for long-term capital appreciation is considered as passive investing. Due to the portfolio here is only rebalanced once a year, it should belong to a passive strategy. With limited maintenance required, the portfolio is similar as investing in index fund; however, the portfolio return is much higher than index fund.

The standard deviation from annual returns for benchmark is 19.17%, which is lower than standard deviation for 120/20 portfolio returns. According to portfolio theory, market portfolio has lower unsystematic risks due to it includes more securities, in this case the index has approximately 250 securities while the constructed portfolio only has forty-two stocks. The lower return volatility is mainly due to its diversification power of the market portfolio. The information ratio for 120/20 strategy is 35.58%, while the information ratio is only 10.05% for 100% strategy.

Regression tests based on monthly returns of the portfolio against the benchmark have been generated based on two periods: 2002-2012 and 2005-2012. The purpose of the regression tests is to ensure the excess returns, generated by the

strategy in this paper, is positive with statistical significance. When the alpha is positive and p-value is significant, the constructed portfolio is statistically proven to outperform the benchmark. The test results indicate that the portfolio has positive alpha and beta greater than 1. See appendix H for more details. Alpha is a measure of performance on a risk-adjusted basis. However, the p-value for both tests is greater than 5%, which indicates that the alpha is insignificant. With a positive alpha but insignificant p-value in this analysis, the excess return from this value strategy is not risk justified; in other words, the portfolio beats the market is mainly due to more risks have been taken. This has been proven also by the beta values. With beta greater than 1, the constructed portfolio is more sensitive to market risk. In other words, the portfolio will react more when the market moves, in both up and down time.

When the 120/20 portfolio performance is viewed alone, it looks appealing comparing to the benchmark. However, the test result is significantly lower than 30.8% annual return generated by Greenblatt, and the potential reasons are as the following.

First of all, Greenblatt's test was based on US stock market. US and Canadian markets are highly correlated, but the total return of the US market is significantly higher than Canadian market as indicated in Appendix F. This directly leads to higher test results for the US market. Also, the strategy in this paper has small deviations from Greenblatt's value investment strategy.

Secondly, the test Greenblatt conducted was for period from 1988 to 2004, while this paper tested more recent period from 2002 to 2012. Even if the difference

between two stock markets were decreasing after 2005, due to lack of recent test results from Greenblatt's strategy, no sufficient evidence suggests that the return will remain as high as 30.8%. Therefore, the returns between two tests are not comparable.

Last but not least, Greenblatt published his book "The little Book that Beats the Market," which is considered one of the classics of finance industry, in 2005. Many people started to follow the strategy in the book to place trades. As explained in the modern finance theory, when more and more people start to invest in a few stocks, which they believe are the golden tickets, the prices will go up to a level that these stocks are no longer considered as at bargain price. Therefore, after 2005, people follow the same strategy are hard to beat the market by simply following the rules in Greenblatt's little investment handbook.

To conclude, the quantitative value strategy stated in this paper is able to beat the market from 2002 to 2012 when only looking at returns; however, as regression test indicates that the excess return is not risk justified. In other words, the portfolio constructed using the famous value strategy does not beat the benchmark after adjusting for risks.

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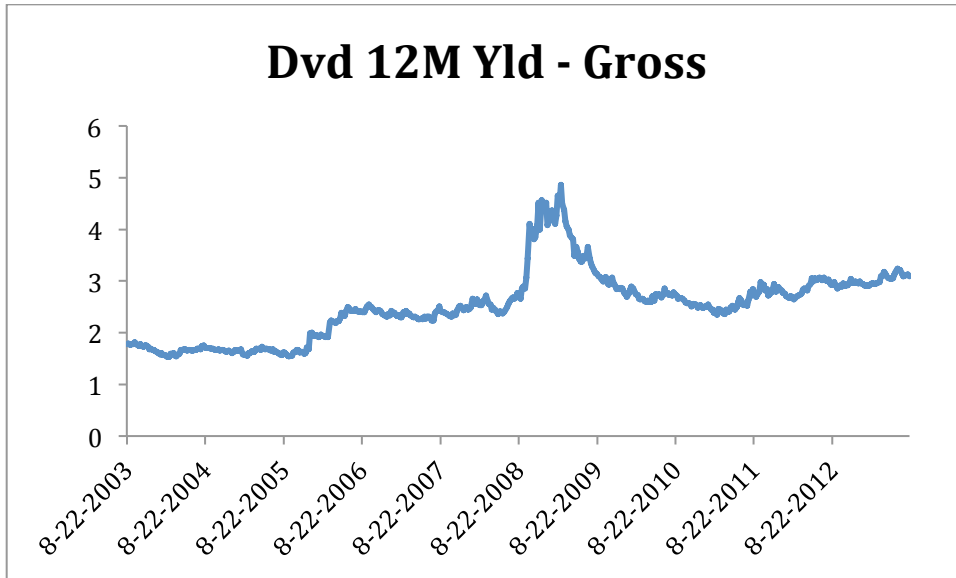
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Appendix

Appendix A: SP/TSX Dividend 12-Month Yield



Appendix B: Security Year-over-year Turnover Ratios

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Turnover	45%	45%	50%	43%	45%	69%	88%	40%	52%
New securities	19	19	21	18	19	29	37	17	22

Appendix C: Return Comparison between Constructed Portfolio and Benchmark

C.1: 120/20 strategy

	Benchmark Return	Portfolio Return	Excess Return
2003	26.28%	19.24%	-7.04%
2004	14.28%	30.75%	16.47%
2005	23.89%	55.00%	31.12%
2006	17.05%	15.55%	-1.50%
2007	9.68%	27.48%	17.80%
2008	-32.31%	-23.41%	8.90%
2009	34.34%	28.47%	-5.87%
2010	17.22%	14.55%	-2.68%
2011	-8.60%	-21.26%	-12.66%
2012	7.01%	19.63%	12.62%
Annualized Return	9.12%	14.22%	4.92%*
Standard Deviation	19.17%	23.55%	13.83%*
Information Ratio	35.58%		

C.2: 100% long strategy

	Benchmark Return	Portfolio Return	Excess Return*
2003	26.28%	23.35%	-2.93%
2004	14.28%	20.35%	6.07%
2005	23.89%	46.60%	22.71%
2006	17.05%	18.88%	1.83%
2007	9.68%	14.62%	4.93%
2008	-32.31%	-32.20%	0.11%
2009	34.34%	24.28%	-10.06%
2010	17.22%	17.55%	0.33%
2011	-8.60%	-18.07%	-9.47%
2012	7.01%	6.32%	-0.69%
Annualized Return	9.12%	9.85%	0.93%*
Standard Deviation	19.17%	22.41%	9.21%*
Information Ratio	10.05%		

* Annualized excess return and SD are calculated using the difference between portfolio and benchmark

C.3: 120/20 strategy with Look-ahead Bias adjustment

	Benchmark Return	Portfolio Return	Excess Return
2003	-17.53%	-34.23%	-16.71%
2004	37.59%	53.34%	15.74%
2005	13.91%	44.23%	30.32%
2006	28.34%	63.17%	34.83%
2007	11.41%	18.36%	6.95%
2008	3.97%	1.61%	-2.35%
2009	-32.44%	-41.89%	-9.45%
2010	42.13%	138.88%	96.74%
2011	20.37%	26.26%	5.89%
2012	-9.76%	-29.09%	-19.32%
Annualized Return	7.20%	13.50%	10.41%*
Standard Deviation	24.13%	54.86%	34.21%*
Information Ratio	30.43%		

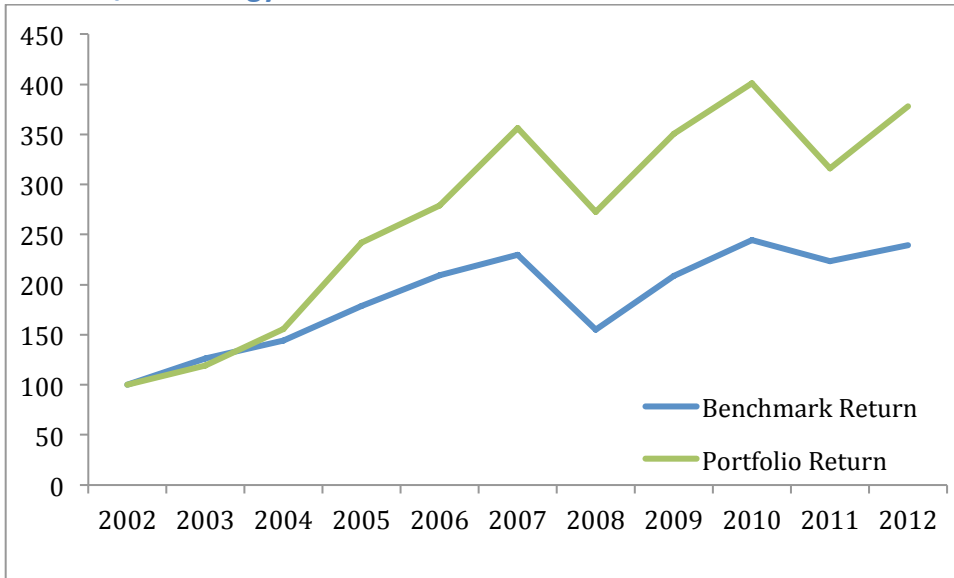
C.4: 100% long strategy with Look-ahead Bias adjustment

	Benchmark Return	Portfolio Return	Excess Return
2003	-17.53%	-12.27%	5.26%
2004	37.59%	38.04%	0.45%
2005	13.91%	41.41%	27.49%
2006	28.34%	50.49%	22.15%
2007	11.41%	15.87%	4.46%
2008	3.97%	8.29%	4.32%
2009	-32.44%	-29.70%	2.74%
2010	42.13%	108.29%	66.15%
2011	20.37%	12.37%	-8.01%
2012	-9.76%	-19.83%	-10.06%
Annualized Return	7.20%	15.61%	9.75%*
Standard Deviation	24.13%	40.55%	22.46%*
Information Ratio	43.39%		

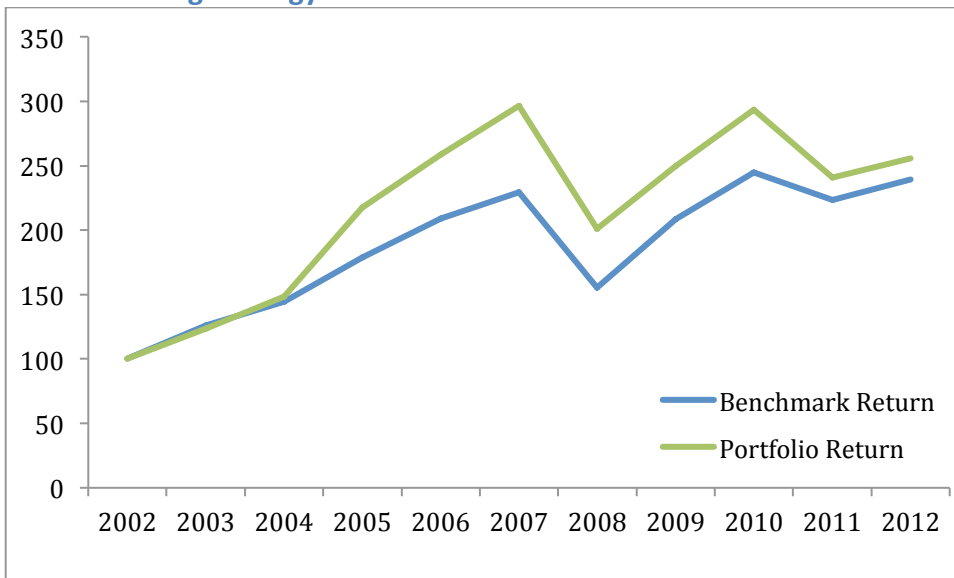
* Annualized excess return and SD are calculated using the difference between portfolio and benchmark

Appendix D: Graph Comparison between Constructed Portfolio and Benchmark with Base Level 100

D.1: 120/20 strategy



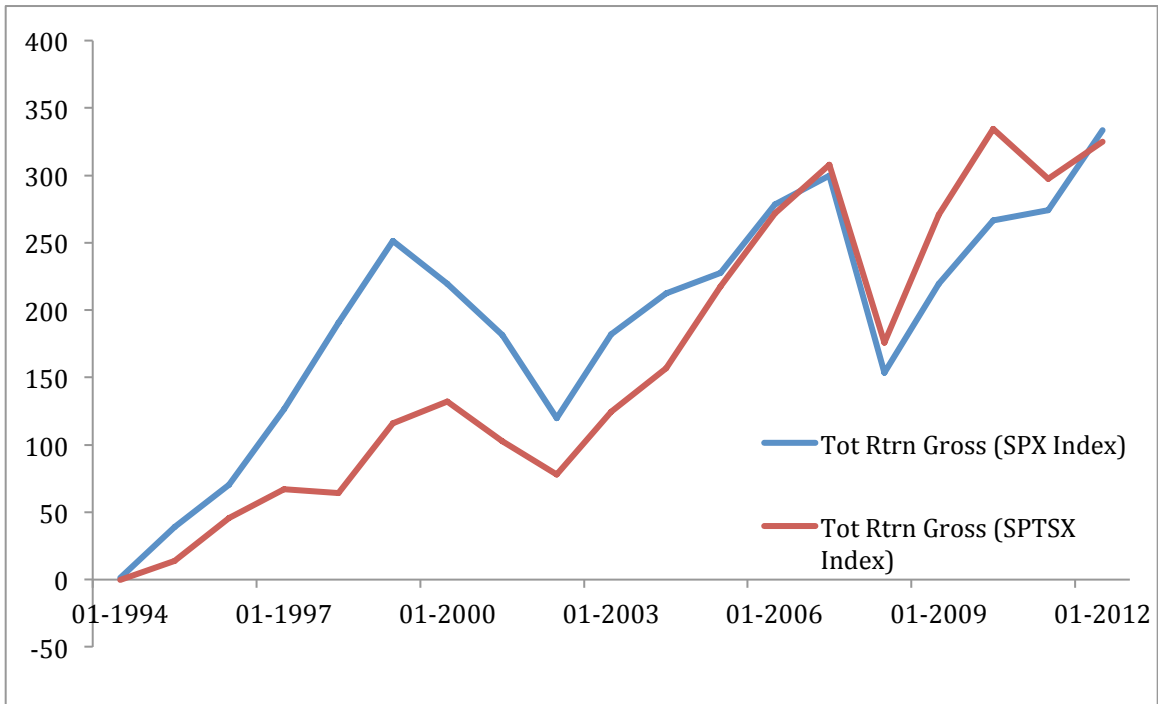
D.2: 100% long strategy



Appendix E: Number of IPOs Introduced to SP/TSX

	2012	2011	2010
IPO	62	61	73

Appendix F: Total Return Comparison between SPX and SPTSX



Appendix G: Security List

G.1: Security List for 2003

Ticker	Name
AAH CT Equity	Aastra Technologies Ltd
0227217Q CT Equity	Rothmans Inc
PKZ CT Equity	PetroKazakhstan Inc
WCS/A CT Equity	Wescast Industries Inc
DFS CT Equity	ArcelorMittal Dofasco Inc
TVA/B CT Equity	TVA Group Inc
WFT CT Equity	West Fraser Timber Co Ltd
UNS CT Equity	Uni-Select Inc
CLC CT Equity	CML HealthCare Inc
DEC/SV/A CT Equity	Decoma International Inc
587977Q CT Equity	Maax Inc
LNF CT Equity	Leon's Furniture Ltd
ST/A CT Equity	St Lawrence Cement Group Inc
RCH CT Equity	Richelieu Hardware Ltd
2901134Q CT Equity	CFM Corp
IFP/A CT Equity	International Forest Products Ltd
2276645Q CT Equity	Slocan Forest Products Ltd
2283832Q CT Equity	Geac Computer Corp Ltd
TSM/SV/A CT Equity	Tesma International Inc
MRU CT Equity	Metro Inc
STN CT Equity	Stantec Inc
S CT Equity	Sherritt International Corp
SAP CT Equity	Saputo Inc
FLY/A CT Equity	CHC Helicopter Corp
LNR CT Equity	Linamar Corp
0623181D CT Equity	Hudson's Bay Co/Old
CCL/B CT Equity	CCL Industries Inc
VN CT Equity	Vincor International Inc
CAS CT Equity	Cascades Inc
DII/B CT Equity	Dorel Industries Inc
GIB/A CT Equity	CGI Group Inc
SCC CT Equity	Sears Canada Inc
MG CT Equity	Magna International Inc
7770556Q CT Equity	Royal Group Inc
CRW-U CT Equity	C International Income Fund
EMP/A CT Equity	Empire Co Ltd
TRQ CT Equity	Turquoise Hill Resources Ltd
DSG CT Equity	Descartes Systems Group Inc/The
BLD CT Equity	Ballard Power Systems Inc
I CT Equity	IntelliPharmaCeutics International Inc/C
IEX CT Equity	Inex Pharmaceuticals Corp
WPT CT Equity	Westport Innovations Inc

G.2: Security List for 2004

Ticker	Name
PKZ CT Equity	PetroKazakhstan Inc
0227217Q CT Equity	Rothmans Inc
WCS/A CT Equity	Wescast Industries Inc
2901134Q CT Equity	CFM Corp
AAH CT Equity	Aastra Technologies Ltd
NBD CT Equity	Norbord Inc
4624687Q CT Equity	Petro-Canada
DFS CT Equity	ArcelorMittal Dofasco Inc
587977Q CT Equity	Maax Inc
TCW CT Equity	Trican Well Service Ltd
SAP CT Equity	Saputo Inc
TVA/B CT Equity	TVA Group Inc
MX CT Equity	Methanex Corp
MRU CT Equity	Metro Inc
IMN CT Equity	Inmet Mining Corp
0623181D CT Equity	Hudson's Bay Co/Old
DEC/SV/A CT Equity	Decoma International Inc
VN CT Equity	Vincor International Inc
TSM/SV/A CT Equity	Tesma International Inc
CNQ CT Equity	Canadian Natural Resources Ltd
ST/A CT Equity	St Lawrence Cement Group Inc
MG CT Equity	Magna International Inc
AIT CT Equity	Aliant Inc
LNF CT Equity	Leon's Furniture Ltd
S CT Equity	Sherritt International Corp
PWT CT Equity	Penn West Petroleum Ltd
IMO CT Equity	Imperial Oil Ltd
TCL/A CT Equity	Transcontinental Inc
SCC CT Equity	Sears Canada Inc
CTC/A CT Equity	Canadian Tire Corp Ltd
NXY CT Equity	Nexen Inc
CCL/B CT Equity	CCL Industries Inc
PJC/A CT Equity	Jean Coutu Group PJC Inc/The
MHM CT Equity	Masonite International Corp/Pre-May 2005
3509785Q CT Equity	Axcan Pharma Inc
EMP/A CT Equity	Empire Co Ltd
GBU CT Equity	Gabriel Resources Ltd
4114559Q CT Equity	Miramar Mining Corp
I CT Equity	IntelliPharmaCeutics International Inc/C
BLD CT Equity	Ballard Power Systems Inc
IDB CT Equity	ID Biomedical Corp
ISA CT Equity	Isotechnika Pharma Inc

G.3: Security List for 2005

Ticker	Name
PKZ CT Equity	PetroKazakhstan Inc
0227217Q CT Equity	Rothmans Inc
NBD CT Equity	Norbord Inc
3419169Q CT Equity	AUR Resources Inc
AAH CT Equity	Aastra Technologies Ltd
IMN CT Equity	Inmet Mining Corp
RUS CT Equity	Russel Metals Inc
DFS CT Equity	ArcelorMittal Dofasco Inc
S CT Equity	Sherritt International Corp
2299424Q CT Equity	Falconbridge Ltd/Old
IPS CT Equity	IPSCO Inc
4624687Q CT Equity	Petro-Canada
IMO CT Equity	Imperial Oil Ltd
MX CT Equity	Methanex Corp
2283832Q CT Equity	Geac Computer Corp Ltd
MG CT Equity	Magna International Inc
AGU CT Equity	Agrium Inc
CNQ CT Equity	Canadian Natural Resources Ltd
TRE CT Equity	Sino-Forest Corp
SAP CT Equity	Saputo Inc
TCL/A CT Equity	Transcontinental Inc
SWI CT Equity	Swisher Hygiene Inc
TVA/B CT Equity	TVA Group Inc
TCK/B CT Equity	Teck Resources Ltd
MRU CT Equity	Metro Inc
3509785Q CT Equity	Axcan Pharma Inc
EXE CT Equity	Extencicare Inc/US
CTC/A CT Equity	Canadian Tire Corp Ltd
NGX CT Equity	Northgate Minerals Corp
GNA CT Equity	Gerdau Ameristeel Corp
ESI CT Equity	Ensign Energy Services Inc
SBY CT Equity	Sobeys Inc
CGS CT Equity	2737469 Canada Inc
EMP/A CT Equity	Empire Co Ltd
SCC CT Equity	Sears Canada Inc
3371363Q CT Equity	Vale Canada Ltd
GBU CT Equity	Gabriel Resources Ltd
TRQ CT Equity	Turquoise Hill Resources Ltd
ZL CT Equity	Zarlink Semiconductor Inc
BLD CT Equity	Ballard Power Systems Inc
BLU CT Equity	BELLUS Health Inc
I CT Equity	IntelliPharmaCeutics International Inc/C

G.4: Security List for 2006

Ticker	Name
3419169Q CT Equity	AUR Resources Inc
IPS CT Equity	IPSCO Inc
0227217Q CT Equity	Rothmans Inc
NBD CT Equity	Norbord Inc
IMN CT Equity	Inmet Mining Corp
RUS CT Equity	Russel Metals Inc
TCK/B CT Equity	Teck Resources Ltd
MX CT Equity	Methanex Corp
AGU CT Equity	Agrium Inc
PD CT Equity	Precision Drilling Corp
4624687Q CT Equity	Petro-Canada
RET/A CT Equity	Reitmans Canada Ltd
DII/B CT Equity	Dorel Industries Inc
TCL/A CT Equity	Transcontinental Inc
GNA CT Equity	Gerdau Ameristeel Corp
MG CT Equity	Magna International Inc
S CT Equity	Sherritt International Corp
RON CT Equity	RONA Inc
VET CT Equity	Vermilion Energy Inc
CLC CT Equity	CML HealthCare Inc
VRX CT Equity	Valeant Pharmaceuticals International In
TRZ/B CT Equity	Transat AT Inc
SBY CT Equity	Sobeys Inc
WTE CT Equity	Westshore Terminals Investment Corp
TRE CT Equity	Sino-Forest Corp
PWT CT Equity	Penn West Petroleum Ltd
LNR CT Equity	Linamar Corp
HSE CT Equity	Husky Energy Inc
IMO CT Equity	Imperial Oil Ltd
CGS CT Equity	2737469 Canada Inc
OTC CT Equity	Open Text Corp
PTF-U CT Equity	Petrofund Energy Trust
AIT CT Equity	Aliant Inc
SAP CT Equity	Saputo Inc
ST/A CT Equity	St Lawrence Cement Group Inc
QLT CT Equity	QLT Inc
0779012D CT Equity	Bema Gold Corp
GSC CT Equity	Golden Star Resources Ltd
IOL CT Equity	InterOil Corp
ELD CT Equity	Eldorado Gold Corp
BLU CT Equity	BELLUS Health Inc
BLD CT Equity	Ballard Power Systems Inc

G.5: Security List for 2007

Ticker	Name
3419169Q CT Equity	AUR Resources Inc
NGX CT Equity	Northgate Minerals Corp
TCK/B CT Equity	Teck Resources Ltd
IMN CT Equity	Inmet Mining Corp
0227217Q CT Equity	Rothmans Inc
MX CT Equity	Methanex Corp
PD CT Equity	Precision Drilling Corp
IPS CT Equity	IPSCO Inc
RUS CT Equity	Russel Metals Inc
3284931Q CT Equity	LionOre Mining International Ltd
VRX CT Equity	Valeant Pharmaceuticals International In
GNA CT Equity	Gerdau Ameristeel Corp
RET/A CT Equity	Reitmans Canada Ltd
ESI CT Equity	Ensign Energy Services Inc
S CT Equity	Sherritt International Corp
TCW CT Equity	Trican Well Service Ltd
FM CT Equity	First Quantum Minerals Ltd
3509785Q CT Equity	Axcan Pharma Inc
HBM CT Equity	HudBay Minerals Inc
SAP CT Equity	Saputo Inc
PSI CT Equity	Pason Systems Inc
RON CT Equity	RONA Inc
4624687Q CT Equity	Petro-Canada
DII/B CT Equity	Dorel Industries Inc
CLC CT Equity	CML HealthCare Inc
TFI CT Equity	TransForce Inc
HSE CT Equity	Husky Energy Inc
IMO CT Equity	Imperial Oil Ltd
PJC/A CT Equity	Jean Coutu Group PJC Inc/The
3467123Q CT Equity	Connors Brothers Income Fund
EFX-U CT Equity	Enerflex Systems Income Fund
PEY CT Equity	Peyto Exploration & Development Corp
LNR CT Equity	Linamar Corp
SCL CT Equity	ShawCor Ltd
WTE CT Equity	Westshore Terminals Investment Corp
TIH CT Equity	Toromont Industries Ltd
POU CT Equity	Paramount Resources Ltd
KRY CT Equity	Crystallex International Corp
IOL CT Equity	InterOil Corp
COM CT Equity	Cardiome Pharma Corp
BLD CT Equity	Ballard Power Systems Inc
BLU CT Equity	BELLUS Health Inc

G.6: Security List for 2008

Ticker	Name
0227217Q CT Equity	Rothmans Inc
PD CT Equity	Precision Drilling Corp
MX CT Equity	Methanex Corp
VRX CT Equity	Valeant Pharmaceuticals International In
HBM CT Equity	HudBay Minerals Inc
FM CT Equity	First Quantum Minerals Ltd
RET/A CT Equity	Reitmans Canada Ltd
3509785Q CT Equity	Axcan Pharma Inc
AAH CT Equity	Aastra Technologies Ltd
4624687Q CT Equity	Petro-Canada
NGX CT Equity	Northgate Minerals Corp
DII/B CT Equity	Dorel Industries Inc
MG CT Equity	Magna International Inc
DH CT Equity	Davis + Henderson Corp
RON CT Equity	RONA Inc
EFX-U CT Equity	Enerflex Systems Income Fund
S CT Equity	Sherritt International Corp
HSE CT Equity	Husky Energy Inc
MRU CT Equity	Metro Inc
0759047D CT Equity	Breakwater Resources Ltd
PSI CT Equity	Pason Systems Inc
TCL/A CT Equity	Transcontinental Inc
PEY CT Equity	Peyto Exploration & Development Corp
SPB CT Equity	Superior Plus Corp
FGL CT Equity	Forzani Group Ltd/The
TFI CT Equity	TransForce Inc
TCM CT Equity	Thompson Creek Metals Co Inc
TIH CT Equity	Toromont Industries Ltd
DDC CT Equity	Dominion Diamond Corp
IMO CT Equity	Imperial Oil Ltd
MBT CT Equity	Manitoba Telecom Services Inc
GIB/A CT Equity	CGI Group Inc
CLC CT Equity	CML HealthCare Inc
CNR CT Equity	Canadian National Railway Co
0339293Q CT Equity	NOVA Chemicals Corp
MDI CT Equity	Major Drilling Group International Inc
FRG CT Equity	Fronteer Gold Inc
FCP CT Equity	First Calgary Petroleums Ltd
AUQ CT Equity	AuRico Gold Inc
KRY CT Equity	Crystallex International Corp
TRQ CT Equity	Turquoise Hill Resources Ltd
BLD CT Equity	Ballard Power Systems Inc

G.7: Security List for 2009

Ticker	Name
RET/A CT Equity	Reitmans Canada Ltd
WTE CT Equity	Westshore Terminals Investment Corp
MDI CT Equity	Major Drilling Group International Inc
LIF CT Equity	Labrador Iron Ore Royalty Corp
FM CT Equity	First Quantum Minerals Ltd
RUS CT Equity	Russel Metals Inc
GNA CT Equity	Gerdau Ameristeel Corp
VET CT Equity	Vermilion Energy Inc
BNP CT Equity	Bonavista Energy Corp
ERF CT Equity	Enerplus Corp
COS CT Equity	Canadian Oil Sands Ltd
TCM CT Equity	Thompson Creek Metals Co Inc
NAE CT Equity	NAL Energy Corp
VRX CT Equity	Valeant Pharmaceuticals International In
4624687Q CT Equity	Petro-Canada
HSE CT Equity	Husky Energy Inc
ESI CT Equity	Ensign Energy Services Inc
POT CT Equity	Potash Corp of Saskatchewan Inc
FRU CT Equity	Freehold Royalties Ltd
IMO CT Equity	Imperial Oil Ltd
DDC CT Equity	Dominion Diamond Corp
MX CT Equity	Methanex Corp
EFX-U CT Equity	Enerflex Systems Income Fund
RON CT Equity	RONA Inc
ECA CT Equity	Encana Corp
PEY CT Equity	Peyto Exploration & Development Corp
ARX CT Equity	ARC Resources Ltd
BTE CT Equity	Baytex Energy Corp
TRE CT Equity	Sino-Forest Corp
VT CT Equity	Viterra Inc
UTS CT Equity	UTS Energy Corp
SCL CT Equity	ShawCor Ltd
GIL CT Equity	Gildan Activewear Inc
TLM CT Equity	Talisman Energy Inc
MTL CT Equity	Mullen Group Ltd
NXY CT Equity	Nexen Inc
TNX CT Equity	Tanzanian Royalty Exploration Corp
EGU CT Equity	European Goldfields Ltd
SSO CT Equity	Silver Standard Resources Inc
0611568D CT Equity	CNOOC Canada Inc
IOL CT Equity	InterOil Corp
COM CT Equity	Cardiome Pharma Corp

G.8: Security List for 2010

Ticker	Name
RET/A CT Equity	Reitmans Canada Ltd
FM CT Equity	First Quantum Minerals Ltd
WTE CT Equity	Westshore Terminals Investment Corp
SCL CT Equity	ShawCor Ltd
HBM CT Equity	HudBay Minerals Inc
IMN CT Equity	Inmet Mining Corp
BB CT Equity	Blackberry Ltd
SJR/B CT Equity	Shaw Communications Inc
NWC CT Equity	North West Co Inc/The
RON CT Equity	RONA Inc
GIB/A CT Equity	CGI Group Inc
PD CT Equity	Precision Drilling Corp
SAP CT Equity	Saputo Inc
MRU CT Equity	Metro Inc
CJR/B CT Equity	Corus Entertainment Inc
ACM/A CT Equity	Astral Media Inc
DH CT Equity	Davis + Henderson Corp
BCB CT Equity	Cott Corp
THI CT Equity	Tim Hortons Inc
QUX CT Equity	KGHM International Ltd
RCI/B CT Equity	Rogers Communications Inc
EXE CT Equity	Extencicare Inc/US
PJC/A CT Equity	Jean Coutu Group PJC Inc/The
T CT Equity	TELUS Corp
QBR/B CT Equity	Quebecor Inc
TCK/B CT Equity	Teck Resources Ltd
DII/B CT Equity	Dorel Industries Inc
ACO/X CT Equity	Atco Ltd/Canada
ATD/B CT Equity	Alimentation Couche Tard Inc
CAE CT Equity	CAE Inc
MBT CT Equity	Manitoba Telecom Services Inc
BCE CT Equity	BCE Inc
STN CT Equity	Stantec Inc
TIH CT Equity	Toromont Industries Ltd
SPB CT Equity	Superior Plus Corp
TCL/A CT Equity	Transcontinental Inc
LSG CT Equity	Lake Shore Gold Corp
WFT CT Equity	West Fraser Timber Co Ltd
CFP CT Equity	Canfor Corp
GBU CT Equity	Gabriel Resources Ltd
CR CT Equity	Crew Energy Inc
PMT CT Equity	Perpetual Energy Inc

G.9: Security List for 2011

Ticker	Name
BB CT Equity	Blackberry Ltd
RET/A CT Equity	Reitmans Canada Ltd
FM CT Equity	First Quantum Minerals Ltd
RUS CT Equity	Russel Metals Inc
CS CT Equity	Capstone Mining Corp
NEM CT Equity	Neo Material Technologies Inc
DII/B CT Equity	Dorel Industries Inc
HBM CT Equity	HudBay Minerals Inc
RON CT Equity	RONA Inc
RCI/B CT Equity	Rogers Communications Inc
TKO CT Equity	Taseko Mines Ltd
SC CT Equity	Shoppers Drug Mart Corp
TGL CT Equity	TransGlobe Energy Corp
WFT CT Equity	West Fraser Timber Co Ltd
NWC CT Equity	North West Co Inc/The
THI CT Equity	Tim Hortons Inc
MRU CT Equity	Metro Inc
ATD/B CT Equity	Alimentation Couche Tard Inc
QUX CT Equity	KGHM International Ltd
GIL CT Equity	Gildan Activewear Inc
PJC/A CT Equity	Jean Coutu Group PJC Inc/The
STN CT Equity	Stantec Inc
TRE CT Equity	Sino-Forest Corp
ACM/A CT Equity	Astral Media Inc
SAP CT Equity	Saputo Inc
CJR/B CT Equity	Corus Entertainment Inc
GIB/A CT Equity	CGI Group Inc
CLC CT Equity	CML HealthCare Inc
TCL/A CT Equity	Transcontinental Inc
CFP CT Equity	Canfor Corp
IMN CT Equity	Inmet Mining Corp
CG CT Equity	Centerra Gold Inc
WJA CT Equity	Westjet Airlines Ltd
DH CT Equity	Davis + Henderson Corp
TCK/B CT Equity	Teck Resources Ltd
TCW CT Equity	Trican Well Service Ltd
DAY CT Equity	Sinopec Daylight Energy Ltd
EGU CT Equity	European Goldfields Ltd
PMT CT Equity	Perpetual Energy Inc
NG CT Equity	Novagold Resources Inc
JAG CT Equity	Jaguar Mining Inc
IE CT Equity	Ivanhoe Energy Inc

G.10: Security List for 2012

Ticker	Name
BB CT Equity	Blackberry Ltd
TGL CT Equity	TransGlobe Energy Corp
PSI CT Equity	Pason Systems Inc
SVM CT Equity	Silvercorp Metals Inc
ARZ CT Equity	Aurizon Mines Ltd
AGU CT Equity	Agrium Inc
TCK/B CT Equity	Teck Resources Ltd
PAA CT Equity	Pan American Silver Corp
COS CT Equity	Canadian Oil Sands Ltd
IMN CT Equity	Inmet Mining Corp
WJA CT Equity	Westjet Airlines Ltd
CG CT Equity	Centerra Gold Inc
CS CT Equity	Capstone Mining Corp
DII/B CT Equity	Dorel Industries Inc
CLS CT Equity	Celestica Inc
MDI CT Equity	Major Drilling Group International Inc
MDA CT Equity	MacDonald Dettwiler & Associates Ltd
PRE CT Equity	Pacific Rubiales Energy Corp
CFW CT Equity	Calfrac Well Services Ltd
GIL CT Equity	Gildan Activewear Inc
TCW CT Equity	Trican Well Service Ltd
HBM CT Equity	HudBay Minerals Inc
POT CT Equity	Potash Corp of Saskatchewan Inc
CLC CT Equity	CML HealthCare Inc
IMG CT Equity	IAMGOLD Corp
FM CT Equity	First Quantum Minerals Ltd
ACM/A CT Equity	Astral Media Inc
TCL/A CT Equity	Transcontinental Inc
RUS CT Equity	Russel Metals Inc
HSE CT Equity	Husky Energy Inc
MTL CT Equity	Mullen Group Ltd
MFL CT Equity	Minefinders Corp Ltd
STN CT Equity	Stantec Inc
CJR/B CT Equity	Corus Entertainment Inc
SAP CT Equity	Saputo Inc
MX CT Equity	Methanex Corp
PDL CT Equity	North American Palladium Ltd
GBG CT Equity	Great Basin Gold Ltd
NKO CT Equity	Niko Resources Ltd
POU CT Equity	Paramount Resources Ltd
SGR CT Equity	San Gold Corp
NG CT Equity	Novagold Resources Inc

Appendix H: Regression Result for Monthly Returns

<i>2002-2012</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Alpha	0.001154661	0.002680765	0.430721	0.667457
Beta	1.170896316	0.065465748	17.88563	2.15E-35

<i>2005-2012</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Alpha	8.04828E-05	0.002904664	0.02770812	0.977953071
Beta	1.185817508	0.067086556	17.67593354	8.55362E-32