

BENCHMARKING AND ANALYSIS ON THE DIVIDEND AND MARKET CAP BASED TWO-MINUTE PORTFOLIO INVESTMENT STRATEGY

by

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Abstract

Two-Minute portfolio aims to be a heuristic investment strategy for conservative investors who prefer a well-diversified and less volatile portfolio. The portfolio rebalances to hold top 2 Canadian dividend-paying stocks (by market capitalization) in each of the 10 GICS sectors at 5% weight. Despite the claim that Two-Minute portfolio consistently outperforms the TSX Composite Index in most of the recent 26 years, quite a few ambiguity is left undefined by the author. The intention of this project is to backtest the return of the Two-Minute portfolio and compare the strategy with traditional mean-variance optimization framework. This project has shown that 1) although per-year return may be higher for the Two-Minute portfolio, holding the Two-Minute portfolio for a prolonged investment period may not be better off than holding the TSX Index, 2) risk-adjusted return in the Two-Minute portfolio is not as desirable as the risk-adjusted return in the TSX market portfolio, and 3) the weight in Two-Minute portfolio is not mean-variance optimal when dealing with the correlation between different portfolio securities.

Keywords: Equal-Weight Portfolio, Trading Strategy, Dividend, Market Capitalization, Back-testing, Rebalancing, Mean-Variance Optimization, Performance Measurement

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Contents

Approval	ii
Abstract	iii
Acknowledgment	iv
Contents	v
List of Tables	vii
List of Figures	ix
Introduction	1
Literature Review	2
Data	5
Procedure	8
Two-Minute Portfolio Construction	8
Portfolio Analysis	10
Results	13
Stock Holding	13
Portfolio Value	14
Discussion	16

Portfolio Return	16
Asset Allocation	19
Portfolio Turnover	19
Conclusion	20
Bibliography	22
Appendices	25
Processing and Identifying Holdings In the Two-Minute Portfolio	25
Value of Two-Minute Portfolio Holding Period	33

List of Tables

1	Holding of Two Minute Portfolio (Year 2012 to Year 2010)	36
2	Holding of Two Minute Portfolio (Year 2009 to Year 2007)	37
3	Holding of Two Minute Portfolio (Year 2006 to Year 2004)	38
4	Holding of Two Minute Portfolio (Year 2003 to Year 2001)	39
5	Holding of Two Minute Portfolio (Year 2000 to Year 1999)	40
6	Holding Value of a Hypothetical Two Minute Portfolio Investor without Account- ing for Dividend	41
7	Holding Value of a Hypothetical Two Minute Portfolio Investor with Dividend Reinvested	42
8	Holding Value of a Hypothetical TSX Composite Price Index Investor (No Divi- dend) Reinvested	43
9	Holding Value of a Hypothetical TSX Composite Total Return Index Investor (Dividend) Reinvested	44
10	Number of Years the Portfolio Holding Value of Two-Minute Portfolio Outper- forms Benchmark Portfolio	45
11	Performance Measurement	46
12	Mean Variance Optimizer Result 2011	47
13	Correlation Matrix of Stock Holding in 2011	48
14	Correlation of GICS Sectors Return in 2011	49

15 Number of Years A Stock Has Been Included in the Two-Minute Portfolio During
1999 to 2012 (Max: 14 Years) 50

List of Figures

1	Annual Return of Investment Strategies	35
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Introduction

Two-Minute portfolio is an investment strategy proposed by Rob Carrick [2012] in 1999 in the Globe and Mail. Rather than traditional portfolio allocation based on mean-variance optimization, Carrick claims that an ideal investment strategy for conservative investors is to rebalance portfolio holding to top 2 Canadian dividend-paying stocks (by market capitalization) in equal portion in each of the 10 GICS (Global Industry Classification Standard) sectors. Subsequently, each of the 10 GICS sectors is weighted equally at 10% of the overall investment portfolio at the beginning of each calendar year. Carrick notes that by following such a simple strategy, investors are better diversified than the TSX Composite Index (by the measurement of lower market risk sensitivity, β), and will incur less financial loss during market downturn.

Despite Carrick's claim that the annual return of the Two-Minute portfolio consistently outperforms the TSX Composite Index in most of the recent 26 years period, the conclusion on Carrick's experiment remains questionable. First of all, Carrick's experiment has been solely concerned with annual returns in a single year period, but fails to demonstrate the effect of holding the Two-Minute portfolio in a longer time horizon and in which extreme return in any single year can severely affect the value of the portfolio holding. Secondly, given that the Two-Minute portfolio is consisted of 20 dividend-paying stocks, there is has been ambiguity regarding whether the portfolio has been benchmarked against the TSX Composite Price Index or the TSX Composite Total Return Index. Prior to 2010, Carrick [2009, 2010] has specified the Two-Minute portfolio has benchmarked against the TSX Total Return Index, but such a description has been dropped thereafter. The difference between the two indexes is rather significant as the former

does not reflect the compounding growth from dividend payment. With a longer time horizon, dividend payment may substantially increase the total value of the Two-Minute portfolio and therefore resulting Two-Minute portfolio outperforms the TSX Composite Price Index. Thirdly, despite Carrick's conclusion Two-Minute portfolio is less volatile than the TSX market portfolio, his account on the risk of the Two-Minute portfolio is solely based on the claim β (systematic market risk) for the portfolio is less than 1. There has not been any measures on the individual risk nor the risk-adjusted return for the investment strategy.

Our first intention with this project is to benchmark the return of the Two-Minute portfolio with these issues in mind and conclude whether a hypothetical investor will be better off by following the Two-Minute portfolio investment strategy in a prolonged investment horizon. To fully observe and account for the volatility in the Two-Minute portfolio strategy and explain whether the investment strategy is ideal for conservative investors, we will be performing analysis on the risk-adjusted return of the Two-Minute portfolio. Finally, we will analyze the differences in portfolio weight between Two-Minute strategy and mean-variance strategy.

Literature Review

The first crucial component of the Two-Minute portfolio has been concerned with the strategy's characteristic in equal-stock and equal-sector weight. In the past, various literature has been focused on testing the performance of an equal-weighted portfolio strategy using measures including Jensen alpha [Jensen, 1968], Sharpe ratio [Sharpe, 1966], Treynor ratio [Treynor, 1965], and Information Ratio [Treynor and Mazuy, 1966]. However, no consensus has been drawn

concluding whether the equal-weight strategy has been better than a market index portfolio.

Duchin and Levy [2009] have benchmarked the performance between an equal-weighted ($1/N$) Talmudic portfolio with out-of-sample Markowitz mean-variance optimized portfolio for the 1991 to 2007 period. The analysis utilizes the first sub-period of the investment horizon to calculate parameters of the mean-variance optimization in the second sub-period. Following the calculation of the mean return and standard deviation of the equal-weighted and mean-variance portfolio, the difference on return at a fixed standard deviation is reported. To conclude the research, Duchin and Levy assert that for investors with smaller number of assets in portfolio (less than 40), when parameters for the optimization are estimated from historical data, there is no clear evidence that the mean-variance optimized portfolio dominates the equal-weighted portfolio. The rationale behind is that the equal-weighted portfolio are not subjected to the sampling errors associated with estimating the parameters from historical data.

DeMiguel et al. [2009] have shown that by using trailing 60-month historical returns, equal sector weighted portfolio has outperformed both S&P 500 market portfolio and out-of-sample mean-variance optimized portfolio by obtaining higher Sharpe ratio when taking account the correlation between asset returns. The authors attribute the poor performance of the mean-variance optimized portfolio to the optimization's sensitivity on estimation error. On the other hand, this conclusion has been rejected by Kritzman et al. [2010], asserting that any reasonable investor will use a significant longer period of estimation window, and with such a longer estimation window, backtesting results show the mean-variance optimized portfolio outperform equal-weighted portfolio.

The second component of the Two-Minute portfolio has been concerned on the timing of rebalancing and the consequential effect on the accumulative return.

Eakins and Stansell [2007] have examined alternative portfolio rebalancing strategies (threshold trigger and calendar interval) on a portfolio initially consisted of 19 sector equally-weighted (at 5.26%) funds on S&P 1500 Super Composite Index. The examination concludes that except for sectors experiencing rapid growth, for the 1995 to 2001 period, optimal return based on Sharpe ratio is achieved based on rebalance threshold when the weight of any sector grows to 9 percent. On the other hand, no significant performance-wise differences can be observed based on different calendar interval rebalancing strategies (based on month, quarter, semi-annual, or annual rebalancing) as long as the interval is consistent throughout the testing period.

The last but yet distinctive component separating Two-Minute portfolio from most other equal-sector weighted portfolio strategies is the imposition on large market capitalization and dividend-paying stocks.

Through empirical testings based on 1963 to 1990 period, Fama and French [1992] conclude that systematic market risk, β , cannot sufficiently explain the average return on a stock, but with additional factors in size (market capitalization) and book-to-market ratio. Fama and French [1993] further extend this conclusion, asserting market capitalization is inversely correlated with stock returns and risks. For instance, stocks with small market capitalization in general 1) earn higher average returns and 2) are more volatile than market portfolio and stocks with large market capitalization. Fama and French [1988] observe that dividend yield accounts for 25% of the variance in the expected return of stock in a period between 2 to 4 years. In addition, Fama

and French [1993] imply high book-to-market ratio, a common indicator of dividend-paying stock, is positively correlated with stock returns.

Fuller and Goldstein [2011] find an asymmetrical relationship between dividend payment and market return. Specifically, dividend-paying stocks outperform non-dividend-paying stocks more during a declining market and the magnitude of outperformance increases as the market further declines.

Data

This section is dedicated to explain the procedures and assumptions that have been performed on the dataset pertaining to prepare data for the stock screening process. Details on the construction of the Two-Minute portfolio will be explained in-depth in the next section of this project.

As mentioned previously, the crucial step for rebalancing in Two-Minute portfolio to determine market capitalization of dividend-paying stocks in each GICS sectors at the beginning of each year. Throughout this project, market capitalization is defined as

$$MktCap_t = Price_t(Closing) \times \#ShareOutstanding_t$$

Therefore, the following data for all stocks traded in the Toronto Stock Exchange at the first trading day of each year is required to screen the stock holdings in the Two-Minute portfolio:

- TIC (ticker) of the stock
- Price at the last trading day of previous year

- Number of shares outstanding at the last trading day of previous year
- Sum of dividend payment in previous year
- GICS sector code

Nevertheless, we found that no single stock database has complete 26 years historical information that is required to identify stocks within the Two-Minute portfolio. The main challenge of using one database is the following:

- Compustat Monthly Update Daily Security has missed dividend information and share outstanding prior to 2000.
- CRSP Quarterly Updated Daily Security has missed GICS code and shares outstanding prior to 1999 and do not use the same ticker code for Canadian stocks as the Compustat database

Therefore, we have used combined stock and market data from four sources:

- Compustat Monthly Update Security Daily for TIC, Company Name, Stock Exchange Code, Security Status Market, Issue Type Code, GIC Sectors, Shares Outstanding, Indicated Annual Dividend, Daily Close Price from 1998 to 2012 (Dividend payment information for 1998 to 2000 is missing)
- CRSP Quarterly Updated Security Daily for CUSIP, Share Code, Exchange Code, Trading Status, Price, Number of Shares Outstanding, and Dividend Cash Amount from 1986 to 2000

- Compustat Annual Update Security Monthly for TIC, CUSIP, Company Name, Stock Exchange Code, Security Status Market, Issue Type Code, GIC Sectors, Shares Outstanding, Indicated Annual Dividend, and Monthly Close Price 1986 to 1998
- CFMRC for TSX daily returns used for market portfolio benchmarking in the corresponding periods

To narrow down the selection of portfolio holding to a scope that is easily accessible and more realistic to individual investors, we have filtered the stock data to include only active common-share type security traded in the Toronto Stock Exchange. In CRSP Quarterly Updated Security Daily, we have filtered data to have a list of CUSIP that has paid dividend in previous year. Then, complete Compustat Annual Update Security Monthly CUSIP (check digit removed) from 1986 to 1998 is matched against CRSP Quarterly Updated Security Daily CUSIP. In this way, we have used December Monthly Close Price, Shares Outstanding, GICS Code from Compustat to calculate market capitalization of dividend paying stock indicated by CRSP.

After a careful look at the data, however, we decide to limit the analysis and benchmark of Two-Minute portfolio to include only 1999 to 2012 time period. This is due to the historical Canadian data on number of shares outstanding prior to 1999 is too dirty for any meaningful examination: First of all, the reporting of number of shares outstanding is not consistent. In many cases, the number of shares outstanding from the database is zero or the number is significantly non-linear between two consecutive years. Secondly, the numbers from CRSP and Compustat for the same month are also significantly different from each other. We think one possible explanation of the poor data quality can be attributed to incomplete historical stock split adjustment,

and therefore we cannot acquire meaningful data for these periods.

Procedure

Two-Minute Portfolio Construction

In order to set up the Two-Minute portfolio, we will be closely following Carrick's description. Specifically, at the beginning of each year, two stocks in each sector are rebalanced to carry equal weight; each of the ten GICS sectors will be equally rebalanced to carry weight at 10% (put in another way, the method indicates equally 5% weight in each of the 20 stock holdings). In brief, the amount of investment in each security i at the first trading day t of each year immediately after re-balancing ($S_{i,t}$) is

$$S_{i,t} = \sum [S_{i,t-1} \times ((P_{i,t} + D_{i,t}) / P_{i,t-1})] \times W_{i,t} \quad (1)$$

where

- $P_{i,t}$ is the daily price of security i in day t
- $W_{i,t}$ is the allowable weight of the security i at day t
- $D_{i,t}$ is the dollar dividend of security i paid at day t

We have modeled the daily balance of security i as

$$S_{i,t} = S_{i,t-1} \times ((P_{i,t} + D_{i,t}) / P_{i,t-1}) \times 1_{\{W_{i,t} > 0\}} \quad (2)$$

where

- $1_{\{W_{i,t}>0\}}$ value of 1 denotes we are holding security i at time t

The major difference between (1) and (2) is at rebalancing day the value of each security i depends on the total value of the portfolio at the previous trading day (in last year); the daily value of each security i on non-rebalancing day depends only on the value of the security at previous trading day. Note that we have assumed dividend is reinvested. This assumption is not only easier to model but is also consistent with the idea embedded in the TSX Composite Total Return index, which accounts for the compounding of dividend payment.

Since Carrick does not have full disclosure on the list of stocks in the Two-Minute portfolio in each year, the difficulty associated with the setup is that in certain years the composition of the Two-Minute portfolio does not have full 20 stocks. For instance, in year 1999 to 2004, only one stock (NDN.) in the Health Care sector satisfies the requirement of dividend payment. In such cases, we have adjusted the weight of the one stock to be 10% of the portfolio. On the other hand, in year 2000, there is no stock in the Information Technology sector pays dividend. We therefore treat the weight of each remaining sector to be 11.11% and each individual stock to be 5.56%.

The source of such discretion can be traced to Carrick's inconsistent definition of the Two-Minute portfolio strategy in the past:

- The 2001 article [Carrick, 2001] has used a different sector classification system. Specifically, the largest market capitalization stocks from each one of 14 Toronto Stock Exchange industries are picked, rather than largest two stocks from 10 GICS sectors.

- A rather major difference is that at least until 2003 [Carrick, 2003], the requirement of dividend-paying stock has not been imposed. Such a discrepancy will result a significant different list of holdings.
- The sector weights in 2003 [Carrick, 2003] and subsequent periods may have been biased. For instance, the 2003 Two-Minute portfolio has been a mixture of GICS sector classification and TSE industry classification. Specifically, Carrick chooses one stock from each of 10 GICS sectors and then one stock from 3 TSE industry classification which he thinks is under-represented in the GICS sector. In effect, material sector has a weight of 23.1%, financial sector has a weight of 15.4%, and the rest 8 of GICS sectors have a weight of 7.7%. Such a manipulation is clearly a contradiction to the advertisement of sector diversification.

Portfolio Analysis

Beyond benchmarking the dollar value of holding the Two-Minute portfolio at each year, several performance measurement ratio will be examined. For simplicity, daily risk-free rate (r_f) used in the following calculations are assumed to be zero. In addition, when presenting the results, return and standard deviation have been annualized using

$$r = (1 + E[r_i])^n - 1$$

and

$$\sigma = \sigma_i \sqrt{n}$$

where

- r_i is the daily return of the asset
- $E[r_i]$ is the arithmetic average of r_i
- σ_i is the standard deviation on daily return of the asset
- n is the number of trading day in a year

To further determine the time-variability of the results, we have additionally sub-grouped data into three time-periods:

1. 1999 to 2005
2. 2005 to 2011
3. 1999 to 2011

The first set of ratio we will be looking at is excess return (r_{excess}) and Jensen's alpha (α). Excess return determines if the return of Two-Minute portfolio has been higher than the market return (TSX in this case); Jensen's alpha determines the excess (abnormal) return of the Two-Minute portfolio over the theoretical CAPM (Capital Asset Pricing Model) expected return.

$$r_{excess} = \text{avg}(r_p - r_m)$$

$$\alpha = r_p - [r_f + \beta(r_m - r_f)]$$

where β , the sensitivity on portfolio return with respect to market return, is defined as

$$\beta = \frac{Cov(r_p, r_m)}{Var(r_p)}$$

R^2 measures the effectiveness of CAPM in predicting the return on an individual asset. Given CAPM expected return is based on the systematic risk of an asset, another interpretation is $1 - R^2$ is the proportion of undiversifiable individual risk of the asset.

$$R^2 = \left[\frac{Cov(r_p, r_m)}{\sigma_p \sigma_m} \right]^2$$

With an assumption on normal distribution, two-sided hypothesis testing will be performed to determine the significance of excess return and Jensen's alpha. Specifically, we will be testing

$$H_0 : r_{excess} = 0$$

$$H_A : r_{excess} \neq 0$$

and

$$H_0 : \alpha = 0$$

$$H_A : \alpha \neq 0$$

To determine the risk-adjusted return, we will be comparing the Sharpe ratio and Treynor ratio of Two-Minute portfolio and TSX market potfolio. Sharpe ratio (S) measures a portfolio's

excess return relative to total risk; Treynor ratio (T) measures a portfolio's excess return relative to systematic (undiversifiable) risk.

$$S = \frac{r_i - r_f}{\sigma_i}$$

$$T = \frac{r_i - r_f}{\beta_i}$$

Information ratio (IR) measures the effectiveness of the trade-off between the active return and the amount of risk taken pertaining to such an active return. Note that the denominator of the equation is also known as the tracking error.

$$IR = \frac{r_p - r_m}{\sqrt{\text{Var}(r_p - r_m)}}$$

To further examine the risk-reward relationship, we will proceed in comparing the Two-Minute portfolio with mean-variance efficient portfolio. Daily return of 2011 will be used to calculate the expected return and variance-covariance matrix for mean-variance optimization in 2012. With respect to the same standard deviation, if the return of Two-Minute portfolio is less than the return from the mean-variance optimizer, then the Two-Minute portfolio is not efficient.

Results

Stock Holding

With the GICS Code and Market Capitalization obtained from previous section, we are able to identify the stock holding of the Two-Minute portfolio. Table 1 to 5 on page 36 to 40 list the hold-

ing of the portfolio at the beginning of each year with the corresponding market capitalization and the Appendices list the VBA codes we have used to process the data.

As a side note, after compiling the Two-Minute portfolio, we have found minor differences between our holding list and that suggested by Carrick for year 2011. For instance, in the 2011 telecommunication sector, Carrick recommends holding Telus (T.) with \$18,717 million market capitalization as the second largest market cap stock; Our calculation as well as a verification on Bloomberg Terminal finds out the market capitalization for Telus at the beginning of 2011 is only \$7,959 million but rather, Rogers (RCL.B) with market capitalization \$15,321 million should be held. The resulting difference is 1.3% higher overall return in Carrick's 2011 version of Two-Minute portfolio and will not affect the conclusion Two-Minute portfolio outperforms TSX indexes in that year. Given that Carrick has significantly updated the definition of Two-Minute portfolio strategy in the past and does not disclose the updated historical holding, it is impossible for us to further trace back and compare the differences between the holding results. Having that said, in order to maintain screening list from consistent data and criteria throughout time, we decide to take the dividend and market capitalization calculation we have from Compustat and CRSP as it is without any manipulation.

Portfolio Value

As previously described, Carrick's ambiguous imposition regarding whether the dividend-paying Two-Minute portfolio has been benchmarked against a dividend-paying market index may lead to a biased conclusion in favour of the Two-Minute portfolio, holding values of the investment

strategy in both cases (with and without dividend) at a specific period are presented in the following tables:

- Table 6 on page 41 lists the holding value of Two-Minute portfolio without accounting for dividend
- Table 7 on page 42 lists the holding value of Two-Minute portfolio with accounting for dividend
- Table 8 on page 43 lists the holding value of TSX Composite Price Index
- Table 9 on page 44 lists the holding value of TSX Composite Total Return Index

The horizontal axis in the tables identifies the start of the investment period and the vertical axis identifies the end of the investment period. For instance, referring to Table 6 on page 41, if an investor starts with \$100,000 capital in the Two-Minute portfolio at the first trading day of 1999, without accounting for dividend payment and any external cashflow, the investor will end up with \$111,056 at the first trading day of 2012.

Table 10 on page 45 demonstrates the summary statistics for the benchmarking of the Two-Minute portfolio with respect to TSX market portfolio. Specifically, it identifies the number of years the portfolio holding value of a Two-Minute portfolio strategy outperforms the TSX Index during a given investment horizon. For instance, an investor who invests the without-dividend Two-Minute portfolio strategy in 2007 will have his/her portfolio holding value higher than the TSX Price Index in 1 of 5 years, measured at each rebalancing.

Discussion

Portfolio Return

Of the three cases we have benchmarked, the case with-dividend Two-Minute portfolio against without dividend TSX index provides the most supportive argument to the Two-Minute portfolio investment strategy. Carrick's description on the performance of the Two-Minute portfolio is most likely to be derived from this case. For instance, by comparing the diagonal axis of Table 7 on page 42 and Table 8 on page 43, we can observe that 1) in 7 of 13 years the annual return of Two-Minute portfolio strategy outperformed the TSX Index, 2) Two-Minute portfolio performs less well than the TSX in times of economic bubbles such as 1999 and 2004 to 2007, and 3) Two-Minute portfolio performs better when TSX performs badly in years such as 2000 and 2008. The reason behind Two-Minute portfolio attaining higher per annum may be associated with Jegadeesh and Titman [1993], which concludes that stocks that have performed well in the past tend to remain performing well in the future 3 to 12 month holding periods: In effect, rebalancing by choosing stock with top 2 market capitalization in each sector picks up stocks that perform well in the past year.

Nevertheless, the above exercise has been only concerned with per annum return in a single period. A look at the cumulative value of the benchmarking result from Table 10 on page 45 yields a set of strikingly different and inconsistent conclusions.

- If an investor starts with \$100,000 in the beginning of 1999, there is only 2 of 13 years the value of the Two-Minute portfolio is greater than if the capital is invested into the TSX

Index.

- An adjacent investment period starts with the beginning of 2000 will outperform the TSX Price Index in 8 of 12 years.
- An investor follows the Two-Minute portfolio investment strategy at the beginning of 2004 will be underperformed by the TSX Price Index in 8 of 8 years.

Figure 1 on page 35 plots the annual return of the Two-Minute portfolio against the TSX Index. An observation on the plot reveals that in 1999 the Two-Minute portfolio has been outperformed by the TSX Total Return Index by 22%. Such 22% difference in one year return leads to the fact that investors who start to invest in Two-Minute portfolio in 2000 will outperform TSX Index 6 more times than investors who start to invest in 1999.

The bottom line we found here is that a single year extreme return can significantly skew the cumulative return of the underlying investment portfolio. In addition, in a more realistic case which investors have greater than one year investment horizon and receive dividend, there is no clear sign that the dollar investment in the Two-Minute portfolio is superior to investment in either TSX Price or TSX Total Return Index.

Table 11 on page 46 lists the performance measurement ratio described in the procedure section of this project. In all three sub-periods, the annualized return of the Two-Minute portfolio is less than the return of TSX market portfolio. However, despite the fact excess returns are greater than -5%, we cannot reject the null hypothesis that excess return or Jensen's alpha is zero at 95% significance. Such results are accompanied by high variances on the differences of return in the two portfolios and offer additional support to our previous conclusion, that in

multiple year investment horizon, there is no evidence that the performance of the Two-Minute portfolio is better than the TSX market portfolio.

The market risk sensitivity, β , in all sub-periods are less than 1. Such results are consistent with Carrick's calculation and partially explain Carrick's description that the Two-Minute portfolio performs less well when the economic in growth and outperform the TSX when the economic is in decline: the return of the Two-Minute portfolio is increased only to a fraction (β) of the increase in the TSX Index and decrease to the same fraction of the decrease in the TSX Index. Recall holdings in the Two-Minute portfolio are among the top market capitalization available in the market, the observed lower β is consistent with the size effect, which implies that larger market capitalization stocks underperform smaller market capitalization stock: the Two-Minute portfolio strategy has no exposure to smaller company in the stage of high growth. However, the result on β should not be overlooked: As R^2 is only 31.25% for 1999 to 2005 period and 55.51% for 1999 to 2011 period, the lower R^2 indicates there remains large portion of individual risks unexplained by β .

A look at σ from all sub-periods indicate the total risk of the Two-Minute portfolio is less than the TSX Price Index market portfolio. However, despite lower risks (measured in term of σ and β) for the Two-Minute portfolio, when the returns from the portfolios are considered, lower values in the two of risk-adjusted return measures, Sharpe ratio and Treynor ratio, as well as negative values in the Information Ratio, all suggest the trade-off between risk and return in the Two-Minute portfolio is not as efficient as the TSX Price Index market portfolio.

Asset Allocation

Taking a step further on asset allocation, the Two-Minute portfolio's strategy of holding top 2 market capitalization stocks in each sector is not mean-variance efficient. With methodology discussed in the procedure section, Table 12 on page 47 shows ten points on the efficient frontier with corresponding return, risk, and weight drawing from historical daily return occurred in 2011. Holding standard deviation at 0.006, the daily return for the first six months of Two-Minute portfolio in 2012 is -0.00018 and the mean-variance portfolio return is 0.0005.

Notice even in the most conservative case, at least one of the two stocks in the many sectors has a weight of zero. The implication behind, as suggested in Table 13 on page 48, is that the high market capitalization security in the same sectors are driven by the same market driver. In addition, some of the more heavily weighted sector in the TSX Index, such as the financial sectors, does not occupy any weight in the mean-variance efficient portfolio. The explanation can be observed from Table 14 on page 49, which shows that the performance of the Canadian Financial sector is more than 60% correlated with Energy, Consumer Discretionary, and Utilities sectors. Therefore, given the risk factors are similar, when the returns in the three sectors are higher, the weight in the financial sector can be substituted without increasing overall portfolio risk.

Portfolio Turnover

Table 15 summarizes the turnover of the stocks in the Two-Minute portfolio. It can be observed that the ranking of market capitalization and dividend paying stocks in the Canadian stock mar-

ket is relatively stable in most sectors. Namely, within the 14 years holding period we are analyzing, all 10 sectors except Energy and Information Technology have at least 1 stock that has been included in the Two-Minute portfolio for 10 years or more. For 8 of 10 sectors the Two-Minute portfolio is dominated by less than 4 stocks. However, a second look at the turnover list may lead to a potentially interesting discussion that whether swapping stocks at the beginning of each year with a firmly set trading rule is necessary and beneficial. For instance, in the Consumer Discretionary sector, Shoppers (SC.) and George Weston (WN.) are competing intensively for the market capitalization leader position. Given that each of the two stocks has been included in the portfolio for 7 times and there is an alternative pattern of switching between the two stock in the Two-Minute portfolio, a more careful benchmark with realistic considerations such as taxation and transaction cost may reveal a seemingly different view on the effectiveness of Two-Minute portfolio trading rule, especially if the returns of the two stocks are highly correlated.

Conclusion

In this project, we have shown that despite the per-year return may be higher for the Two-Minute portfolio, holding the Two-Minute portfolio for a prolonged investment period may not be better off than holding the TSX Index (with or without dividend). In fact, in most of the cases as we have shown, the value of the resulting Two-Minute portfolio is less than holding the TSX Index despite of dividend payment. Extreme return in any single year could significantly affect the accumulative return of the Two-Minute portfolio.

The return of Two-Minute portfolio has been consistently less volatile than the TSX Index

mainly arises from the fact Two-Minute portfolio is composed of large-cap stocks rather than better diversification. Nevertheless, when risk-adjusted return is concerned, the return in the Two-Minute portfolio is not as desirable as the return in the TSX market portfolio. From the prospective of diversification, the Two-Minute portfolio investment strategy of holding equal weight in the top 2 market capitalization stock is not optimal in terms of dealing with the correlation between different securities.

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Appendices

Processing and Identifying Holdings In the Two-Minute Portfolio

```
1 Sub Main()  
2 ' Start Program by Running this Macro  
3 ' Requires processed WRDS data in "WRDS20XX.csv"  
4 ' Zhong Wang (2012)  
5  
6 StartDate = 1999  
7 EndDate = 2012  
8  
9 Call ReadandJoinWRDSCSV(StartDate, EndDate)  
10 Call CreatSummaryPivot  
11 Call HoldingSummary(StartDate, EndDate)  
12 Call GetTickerList(StartDate, EndDate)  
13 Call LookUpCompanyName  
14  
15 MsgBox "Stage 1 Completed. Fetch Stock daily price with TICList  
16 .txt from WRDS"  
17  
18 End Sub  
19  
20 Sub ReadandJoinWRDSCSV(StartDate, EndDate)  
21 '  
22 On Error Resume Next  
23 Application.DisplayAlerts = False  
24 ActiveWorkbook.Sheets("AggregatedData").Delete  
25  
26 Application.DisplayAlerts = True  
27 On Error GoTo 0  
28  
29 Sheets.Add(After:=Worksheets(Worksheets.Count)).Name = "  
30 AggregatedData"  
31  
32 Header = 0  
33  
34 For i = EndDate To StartDate Step -1  
35  
36 If i >= 1998 Then  
37 Workbooks.Open Filename:=ThisWorkbook.Path & "\WRDS\  
38 WRDS" & i & ".csv"
```

```

39     If Header = 1 Then
40     Range("A1").Select
41     ActiveCell.Offset(1, 0).Range("A1").Select
42     End If
43
44
45     Range(Selection, Selection.End(xlDown)).Select
46     Range(Selection, Selection.End(xlToRight)).Select
47     Selection.Copy
48     Windows("VBAProctocol_Stage1.xlsm").Activate
49     Sheets("AggregatedData").Select
50     ActiveSheet.Paste
51     Windows("WRDS" & i & ".csv").Activate
52     Application.DisplayAlerts = False
53     ActiveWindow.Close
54     Application.DisplayAlerts = True
55     LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
        xlByRows, SearchDirection:=xlPrevious).Row
56     Range("A" & LastRow + 1).Select
57
58     Header = 1
59
60     End If
61
62     Next i
63
64     LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
        xlByRows, SearchDirection:=xlPrevious).Row
65
66     Range("A1").Select
67     Selection.End(xlToRight).Select
68     ActiveCell.Offset(0, 1).Range("A1").Select
69     ActiveCell.FormulaR1C1 = "MktCap"
70     ActiveCell.Offset(1, 0).Range("A1").Select
71     ActiveCell.FormulaR1C1 = "=RC[-9]*RC[-7]"
72     ActiveCell.Select
73     Selection.AutoFill Destination:=ActiveCell.Range("A1:A" &
        LastRow)
74
75     Range("A1").Select
76     Selection.End(xlToRight).Select
77     ActiveCell.Offset(0, 1).Range("A1").Select
78     ActiveCell.FormulaR1C1 = "Year"
79     ActiveCell.Offset(1, 0).Range("A1").Select
80     ActiveCell.FormulaR1C1 = "=LEFT(RC[-13],4)"

```

```

81     ActiveCell.Select
82     Selection.AutoFill Destination:=ActiveCell.Range("A1:A" &
      LastRow)
83
84     Cells.Replace "#N/A", "=Rand()/1000", xlWhole
85
86
87 End Sub
88
89
90 Sub LookUpCompanyName()
91
92     Dim command As String
93
94     Lastcolumn = Cells.Find(What:="*", After:=[A1], SearchOrder
      :=xlByColumns, SearchDirection:=xlPrevious).Column
95     LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
      xlByRows, SearchDirection:=xlPrevious).Row
96     LastAddress = Cells(LastRow, Lastcolumn).Address
97
98     Range("B1").Select
99     ActiveCell.Range("C1:C" & LastRow).Select
100
101     command = "=INDEX(AggregatedData!" & "E2:E50000,MATCH(A1:
      A500,AggregatedData!D2:D50000,0))"
102     Selection.FormulaArray = command
103
104
105 End Sub
106
107 Sub HoldingSummary(StartDate, EndDate)
108
109     On Error Resume Next
110
111         Application.DisplayAlerts = False
112         ActiveWorkbook.Sheets("HoldingSummary").Delete
113         Application.DisplayAlerts = True
114     On Error GoTo 0
115
116     Sheets.Add(After:=Worksheets(Worksheets.Count)).Name = "
      HoldingSummary"
117
118     For i = StartDate To EndDate
119
120         Range("A1").Select

```

```

121 ActiveCell.FormulaR1C1 = "Year" & i
122 ActiveCell.Offset(1, 0).Range("A1").Select
123 Sheets("PivotTable").Select
124
125
126 ActiveSheet.PivotTables("PivotTable2").PivotFields("Year").
    ClearAllFilters
127 ActiveSheet.PivotTables("PivotTable2").PivotFields("Year").
    CurrentPage = i
128
129
130 Range("A7").Select
131 ActiveCell.Range("A1:C1").Select
132 Range(Selection, Selection.End(xlDown)).Select
133 Selection.Copy
134 Sheets("HoldingSummary").Select
135 ActiveSheet.Paste
136 ActiveCell.Columns("A:A").EntireColumn.Select
137 Application.CutCopyMode = False
138 Selection.Insert Shift:=xlToRight, CopyOrigin:=
    xlFormatFromLeftOrAbove
139 Selection.Insert Shift:=xlToRight, CopyOrigin:=
    xlFormatFromLeftOrAbove
140 Selection.Insert Shift:=xlToRight, CopyOrigin:=
    xlFormatFromLeftOrAbove
141 Next i
142
143 Lastcolumn = Cells.Find(What:="*", After:=[A1], SearchOrder
    :=xlByColumns, SearchDirection:=xlPrevious).Column
144 LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
    xlByRows, SearchDirection:=xlPrevious).Row
145 LastAddress = Cells(LastRow, Lastcolumn).Address
146
147 Lastcolumn = Cells.Find(What:="*", After:=[A1], SearchOrder
    :=xlByColumns, SearchDirection:=xlPrevious).Column
148 LastColumnLetter = Left(Cells(1, Lastcolumn).Address(False,
    False), 1 - (Lastcolumn > 26))
149
150 ActiveCell.Columns("A:" & LastColumnLetter).EntireColumn.
    EntireColumn.AutoFit
151
152
153 End Sub
154
155

```

```

156
157 Sub GetTickerList(StartDate, EndDate)
158
159     ActiveWorkbook.Sheets("HoldingSummary").Select
160
161     Lastcolumn = Cells.Find(What:="*", After:=[A1], SearchOrder
        :=xlByColumns, SearchDirection:=xlPrevious).Column
162     LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
        xlByRows, SearchDirection:=xlPrevious).Row
163     LastAddress = Cells(LastRow, Lastcolumn).Address
164
165     ActiveSheet.Range("$A$1:" & LastAddress).Select
166
167     Application.DisplayAlerts = False
168     Selection.CreateNames Top:=True, Left:=False, Bottom:=False
        , Right:= _
169         False
170     Application.DisplayAlerts = True
171
172
173     On Error Resume Next
174
175         Application.DisplayAlerts = False
176         ActiveWorkbook.Sheets("TICList").Delete
177         Application.DisplayAlerts = True
178     On Error GoTo 0
179
180
181     Sheets.Add(After:=Worksheets(Worksheets.Count)).Name = "
        TICList"
182
183
184
185 For i = StartDate To EndDate
186
187     ThisWorkbook.Names("Year" & i).RefersToRange.Copy
188     ActiveSheet.Paste
189
190     Lastcolumn = Cells.Find(What:="*", After:=[A1], SearchOrder
        :=xlByColumns, SearchDirection:=xlPrevious).Column
191     LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
        xlByRows, SearchDirection:=xlPrevious).Row
192     LastAddress = Cells(LastRow, Lastcolumn).Address
193
194

```

```

195     Range("$A" & LastRow + 1).Select
196
197 Next i
198
199
200     ActiveSheet.Range("$A$1:" & LastAddress).RemoveDuplicates
        Columns:=1, Header:=xlNo
201
202
203     Lastcolumn = Cells.Find(What:="*", After:=[A1], SearchOrder
        :=xlByColumns, SearchDirection:=xlPrevious).Column
204     LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
        xlByRows, SearchDirection:=xlPrevious).Row
205     LastAddress = Cells(LastRow, Lastcolumn).Address
206
207     ActiveSheet.Range("$A$1:" & LastAddress).Select
208
209     For Each cell In Selection
210     If IsNumeric(cell) Then
211         cell.ClearContents
212     End If
213     Next cell
214
215
216     On Error Resume Next
217     Columns(1).SpecialCells(xlCellTypeBlanks).EntireRow.Delete
218     On Error GoTo 0
219         LastRow = Cells.Find(What:="*", After:=[A1],
                SearchOrder:=xlByRows, SearchDirection:=
                xlPrevious).Row
220
221     Range("A1:A" & LastRow).Select
222     Selection.Copy
223     Application.DisplayAlerts = False
224     Workbooks.Add
225     ActiveSheet.Paste
226     ActiveWorkbook.SaveAs Filename:= _
227     ThisWorkbook.Path & "\TICList.txt" _
228     , FileFormat:=xlCSV, CreateBackup:=False
229
230     ActiveWorkbook.Close
231     Application.DisplayAlerts = True
232
233 End Sub
234

```

```

235
236 Sub CreatSummaryPivot()
237
238     On Error Resume Next
239
240         Application.DisplayAlerts = False
241         ActiveWorkbook.Sheets("PivotTable").Delete
242         Application.DisplayAlerts = True
243     On Error GoTo 0
244
245
246
247     Sheets("AggregatedData").Select
248
249     Lastcolumn = Cells.Find(What:="*", After:=[A1], SearchOrder
        :=xlByColumns, SearchDirection:=xlPrevious).Column
250     LastRow = Cells.Find(What:="*", After:=[A1], SearchOrder:=
        xlByRows, SearchDirection:=xlPrevious).Row
251     LastAddress = Cells(LastRow, Lastcolumn).Address
252
253
254
255     Range("A1").Select
256     Range(Selection, Selection.End(xlToRight)).Select
257     Range(Selection, Selection.End(xlDown)).Select
258     Sheets.Add(After:=Worksheets(Worksheets.Count)).Name = "
        PivotTable"
259
260     ActiveWorkbook.PivotCaches.Create(SourceType:=xlDatabase,
        SourceData:= _
261         "AggregatedData!R1C1:R" & LastRow & "C16", Version:=
        xlPivotTableVersion14). _
262         CreatePivotTable TableDestination:="PivotTable!R3C1",
        TableName:="PivotTable2" _
263         , DefaultVersion:=xlPivotTableVersion14
264     Sheets("PivotTable").Select
265     Cells(3, 1).Select
266     Sheets("PivotTable").Select
267     With ActiveSheet.PivotTables("PivotTable2").PivotFields("
        Year")
268         .Orientation = xlPageField
269         .Position = 1
270     End With
271     ActiveSheet.PivotTables("PivotTable2").AddDataField
        ActiveSheet.PivotTables( _

```



```

272         "PivotTable2").PivotFields("MktCap"), "Sum of MktCap",
           xlSum
273 With ActiveSheet.PivotTables("PivotTable2").PivotFields("
           GSECTOR")
274     .Orientation = xlRowField
275     .Position = 1
276 End With
277 With ActiveSheet.PivotTables("PivotTable2").PivotFields("
           SECSTAT")
278     .Orientation = xlPageField
279     .Position = 1
280 End With
281 With ActiveSheet.PivotTables("PivotTable2").PivotFields("
           EXCHG")
282     .Orientation = xlPageField
283     .Position = 1
284 End With
285 ActiveSheet.PivotTables("PivotTable2").AddDataField
           ActiveSheet.PivotTables( _
286     "PivotTable2").PivotFields("PRCCD"), "Sum of PRCCD",
           xlSum
287 With ActiveSheet.PivotTables("PivotTable2").PivotFields("
           tic")
288     .Orientation = xlRowField
289     .Position = 2
290 End With
291 Sheets("PivotTable").Name = "PivotTable"
292 ActiveSheet.PivotTables("PivotTable2").PivotFields("tic").
           PivotFilters.Add _
293     Type:=xlTopCount, DataField:=ActiveSheet.PivotTables("
           PivotTable2"). _
294     PivotFields("Sum of MktCap"), Value1:=2
295 ActiveSheet.PivotTables("PivotTable2").PivotFields("EXCHG")
           .ClearAllFilters
296 ActiveSheet.PivotTables("PivotTable2").PivotFields("EXCHG")
           .CurrentPage = "7"
297 ActiveSheet.PivotTables("PivotTable2").PivotFields("SECSTAT
           ").ClearAllFilters
298 ActiveSheet.PivotTables("PivotTable2").PivotFields("SECSTAT
           ").CurrentPage = "A"
299
300 With ActiveSheet.PivotTables("PivotTable2").PivotFields("
           GSECTOR")
301     .PivotItems("(blank)").Visible = False
302 End With

```

```

303 With ActiveSheet.PivotTables("PivotTable2").PivotFields("
      TPCI")
304     .Orientation = xlPageField
305     .Position = 1
306 End With
307 ActiveSheet.PivotTables("PivotTable2").PivotFields("TPCI").
      ClearAllFilters
308 ActiveSheet.PivotTables("PivotTable2").PivotFields("TPCI").
      CurrentPage = "0"
309
310 With ActiveSheet.PivotTables("PivotTable2")
311     .ColumnGrand = False
312     .RowGrand = False
313 End With
314 ActiveCell.Select
315 ActiveSheet.PivotTables("PivotTable2").PivotFields("GSECTOR
      ").Subtotals = Array _
316     (False, False, False, False, False, False, False, False
      , False, False, False, False)
317 End Sub

```

Value of Two-Minute Portfolio Holding Period

```

1 Sub HoldingPeriodValue()
2 ' Calculate the Holding Period Value
3 ' Zhong Wang and Qi Yang (2012)
4
5 Range("A1").Select
6
7     Range("AQ4").Select
8     Selection.AutoFill Destination:=ActiveCell.Range("A1:A3461"
9         )
10    ActiveCell.Range("A1:A3461").Select
11
12 For j = 0 To 12
13
14
15     Cells.Find(What:=1999 + j & "01", After:=ActiveCell, LookIn
16         :=xlFormulas, LookAt _
17         :=xlPart, SearchOrder:=xlByRows, SearchDirection:=
18         xlNext, MatchCase:= _
19         False, SearchFormat:=False).Activate
20     ActiveCell.Offset(-1, 40).Range("A1").Select
21     ActiveCell.FormulaR1C1 = "100000"

```

```
20
21
22 For i = 1 To 13
23
24
25     Cells.Find(What:=1999 + i & "01", After:=ActiveCell, LookIn
        :=xlFormulas, LookAt _
26         :=xlPart, SearchOrder:=xlByRows, SearchDirection:=
            xlNext, MatchCase:= _
27             False, SearchFormat:=False).Activate
28     ActiveCell.Offset(-1, 40).Range("A1").Select
29     Selection.Copy
30     Application.Goto Reference:="R4C46"
31     ActiveCell.Offset(1 + i, j).Range("A1").Select
32     Selection.PasteSpecial Paste:=xlPasteValues, Operation:=
        xlNone, SkipBlanks _
33         :=False, Transpose:=False
34
35 Next i
36
37 Next j
38
39 End Sub
```

Figure 1: Annual Return of Investment Strategies



Table 1: Holding of Two Minute Portfolio (Year 2012 to Year 2010)

Year2012	MktCap	Price	Year2011	MktCap	Price	Year2010	MktCap	Price
<u>Energy</u>								
CNQ.	43074923940	39.33	CNQ.	48072741580	44.14	CNQ.	41730908400	76.95
SU.	49527352160	31.46	SU.	59486343360	38.04	SU.	59705870000	38.3
<u>Material</u>								
ABX.	48871530960	48.86	ABX.	50867740000	51.59	ABX.	41370194560	42.08
POT.	37744187880	43.96	POT.	46439172000	156	POT.	34526353890	116.69
<u>Industrial</u>								
CNR.	35157675340	79.21	CNR.	30569290680	66.27	CNR.	26861736780	57.06
CP.	11906991630	70.11	CP.	10901330800	64.45	CP.	9527025200	56.6
<u>Con Disc</u>								
SJR.B	8415979410	20.19	MG.	13537816600	55.85	SJR.B	8876124500	21.5
TRI.	22715918100	27.45	TRI.	31305059600	37.61	TRI.	28242329850	34.05
<u>Con Stap</u>								
L.	10636704250	37.75	L.	11283495740	40.37	L.	9391758250	33.95
SC.	8836296040	41.14	WN.	10875775240	84.26	SC.	9992531280	45.96
<u>Heal Care</u>								
CLC.	861316260	9.59	CLC.	1051272280	11.72	CLC.	1270771260	14.19
NDN.	540825930	8.67	DR.	305515980	10.78	VRX.	2423343350	15.31
<u>Financials</u>								
RY.	75362272400	52.34	RY.	74309093760	52.14	RY.	75778849120	56.62
TD.	69181147350	76.65	TD.	65202993400	74.12	TD.	56448759000	65.64
<u>Info Tech</u>								
CSU.	1436553280	82.07	CSU.	864872640	49.41	CSU.	650273600	37.15
MDA.	1497450300	47.1	ET.	1275117020	17.26	ET.	968510420	13.22
<u>Telecom</u>								
BCE.	33024359550	42.45	BCE.	26674656800	35.3	BCE.	22339873920	29.12
RCLB	16304903040	39.32	RCLB	15320894020	34.34	RCLB	15559646280	31.74
<u>Utilities</u>								
CU.	5333731320	61.14	FTS.	5920003200	34.07	FTS.	4891185300	28.65
FTS.	6185795770	32.83	TA.	4673390190	21.21	TA.	5141088920	23.54

Table 2: Holding of Two Minute Portfolio (Year 2009 to Year 2007)

Year2009	MktCap	Price	Year2008	MktCap	Price	Year2007	MktCap	Price
<u>Energy</u>								
ECA.	44804135000	59.75	ECA.	52039297500	69.25	ECA.	43228468200	54.35
IMO.	36848045010	42.37	SU.	50700434330	109.61	SU.	41844988680	91.02
<u>Material</u>								
ABX.	38137043440	43.72	ABX.	39671493400	45.65	ABX.	31223593260	36.18
POT.	28573925700	94.7	POT.	45812453400	144.9	G.	23629783380	33.62
<u>Industrial</u>								
BBD.B	6781677120	4.72	CNR.	22528967120	46.07	CNR.	25812393320	50.23
CNR.	21649717500	46.25	CP.	9810680880	64.02	CP.	9706111460	62.18
<u>Con Disc</u>								
SJR.B	8979183500	22.19	SJR.B	9676098340	23.62	MG.	10235243130	94.17
TRI.	22638462950	35.15	TRI.	25726287960	40.14	TRI.	31106470500	48.55
<u>Con Stap</u>								
L.	9659150020	35.23	L.	9398684720	34.28	L.	13678540860	49.89
SC.	10099009500	46.5	SC.	11638005470	53.69	SC.	11839922280	49.82
<u>Heal Care</u>								
CLC.	1185341850	13.23	CLC.	1511041120	17.48	NDN.	3048284000	21.11
VRX.	1856988900	11.7	VRX.	2148060160	13.34	VRX.	3957952700	24.7
<u>Financials</u>								
RY.	49452993200	36.95	MFC.	59271005520	39.51	MFC.	61087974500	39.5
TD.	37312617470	44.09	RY.	64043704200	50.2	RY.	71046803430	55.53
<u>Info Tech</u>								
CSU.	435278000	25.75	CSU.	422600000	25	CRY.	369044280	27.06
ET.	992811180	13.74	ET.	2144288000	29.65	SO.	193495810	11.21
<u>Telecom</u>								
BCE.	20175700000	25	BCE.	31729433940	39.42	BCE.	25444972800	31.33
RCL.B	19601741950	37.45	RCL.B	23427441180	44.46	RCL.B	18218661120	34.88
<u>Utilities</u>								
FTS.	4239425260	25.06	FTS.	4565123160	29.38	CU.	3953194680	48.54
TA.	4989930250	25.25	TA.	6774824320	33.56	TA.	5436480000	26.88

Table 3: Holding of Two Minute Portfolio (Year 2006 to Year 2004)

Year2006	MktCap	Price	Year2005	MktCap	Price	Year2004	MktCap	Price
<u>Energy</u>								
ECA.	46251381380	53.87	ECA.	30668034600	66.6	ECA.	23839083450	51.35
IMO.	40313611950	119.89	IMO.	24778784030	70.07	IMO.	21368851680	58.08
<u>Material</u>								
ABX.	17890558200	33.3	ABX.	14892832970	28.01	ABX.	15827139540	29.66
TCK.B	12324903450	61.97	POT.	10560847810	96.41	POT.	5843679900	111.34
<u>Industrial</u>								
CNR.	25171131300	93.45	CNR.	20694134000	72.25	CNR.	16029680800	82.64
CP.	7345491840	46.56	CP.	6507315000	41	CP.	5811104000	36.64
<u>Con Disc</u>								
MG.	9035690690	83.53	MG.	9395881410	98.03	MG.	9911425500	104.7
TRI.	26007919420	39.97	TRI.	27654268880	42.22	TRI.	31088001560	47.74
<u>Con Stap</u>								
L.	15506031900	56.58	L.	19488418180	71.06	L.	18684668700	67.85
WN.	11303728800	87.6	WN.	14157006020	109.82	WN.	13923916020	105.39
<u>Heal Care</u>								
NDN.	2902903910	20.39	CLC.	1035606750	13.25	NDN.	2811356630	19.97
VRX.	4588888080	28.76	NDN.	2368327200	16.7			
<u>Financials</u>								
MFC.	54821554800	69.2	MFC.	45355871160	55.82	BNS.	33334403080	65.96
RY.	59244791320	91.72	RY.	41163580900	63.82	RY.	41155787250	62.19
<u>Info Tech</u>								
CRY.	302148440	22.66	CRY.	357870240	27.31	CRY.	192422160	15.69
CTY.	89727750	10.55	CTY.	120590400	14.55	CTY.	97794200	11.9
<u>Telecom</u>								
BCE.	25843628040	27.87	BCE.	26875501680	29.06	BCE.	26897590720	29.12
RCLB	12883044810	49.89	T.	6859100040	35.48	T.	5101661100	26.85
<u>Utilities</u>								
CU.	3600390430	43.43	TA.	3526128270	18.27	TA.	3535918110	18.63
TA.	5260992000	26.5	VNR.	2586253600	22.6	VNR.	2518736360	22.01

Table 4: Holding of Two Minute Portfolio (Year 2003 to Year 2001)

Year2003	MktCap	Price	Year2002	MktCap	Price	Year2001	MktCap	Price
<u>Energy</u>								
ECA.	23557427400	49.4	IMO.	16913530000	43.6	ECA.	10137848000	40.25
IMO.	17166282530	45.31	SU.	10898069900	48.89	IMO.	16748589000	39
<u>Material</u>								
ABX.	13387400000	24.7	ABX.	13776407900	25.7	ABX.	10110871440	25.56
POT.	5255154150	100.95	POT.	5075576800	97.72	POT.	5972803200	113.95
<u>Industrial</u>								
BBD.B	5824172550	5.65	BBD.B	17282758550	16.85	BBD.B	22396779600	21.9
CNR.	13357140030	66.69	CNR.	14740697650	76.55	CP.	13702920000	42
<u>Con Disc</u>								
MG.	8611089480	91.14	MG.	8254662240	100.76	SJR.B	6218048000	32
TRI.	28028413560	43.26	TRI.	29719385040	47.12	TRI.	33175233000	54.6
<u>Con Stap</u>								
L.	14917662000	54	L.	14149678660	51.22	L.	14084262000	51
WN.	12084954000	91.5	WN.	13291212600	101.1	WN.	11034807750	83.95
<u>Heal Care</u>								
NDN.	3105447800	22.1	NDN.	2619393750	18.75	NDN.	3081270400	22.1
<u>Financials</u>								
BNS.	27146969700	53.85	RY.	34809876000	51.6	RY.	28951392000	48
RY.	38791135670	58.31	TD.	25808767040	40.36	TD.	25620498750	41.25
<u>Info Tech</u>								
CTY.	40195000	5						
<u>Telecom</u>								
BCE.	26336227500	29.1	BCE.	28706449500	35.65	BCE.	34217480000	41.8
T.	3289207840	17.69	T.	4347792000	24	T.	7279231050	40.95
<u>Utilities</u>								
TA.	2955420000	17.55	CU.	1968945190	49.43	CU.	2078379100	52.85
VNR.	2086759410	18.89	TA.	3635029280	21.52	TA.	3584492500	21.25

Table 5: Holding of Two Minute Portfolio (Year 2000 to Year 1999)

Year2000	MktCap	Price	Year1999	MktCap	Price
<u>Energy</u>					
IMO.	13375725000	31	IMO.	10680148400	24.4
SU.	7403902000	67	TRP.	10414785150	22.55
<u>Material</u>					
ABX.	10146165300	25.65	ABX.	11200131250	29.75
POT.	4002043750	73.75	POT.	5375283100	99.1
<u>Industrial</u>					
BBD.B	15212540000	30.1	BBD.B	11279072000	22.4
CP.	10262429800	31.15	CP.	9966347850	29.85
<u>Con Disc</u>					
MG.	4731930000	61.25	MG.	7350718100	95.15
TRI.	23696595000	39	TRI.	22572525750	37.15
<u>Con Stap</u>					
L.	9151672500	33.3	L.	9107864500	37.1
WN.	6625044500	50.5	WN.	7784413500	58.25
<u>Heal Care</u>					
NDN.	1300328000	29.6	NDN.	1321410000	30
<u>Financials</u>					
RY.	18999318000	61.5	BNS.	16829443800	34.2
TD.	22767946000	36.7	RY.	23977621150	77.65
<u>Info Tech</u>					
			CTY.	28054400	3.2
<u>Telecom</u>					
BCE.	75893173200	117.9	BCE.	37210558000	58.3
T.	6501710000	36.65	T.	5258950000	42.5
<u>Utilities</u>					
TA.	2510775600	14.8	CU.	1899216500	48.25
VNR.	1568659800	14.2	TA.	3691408000	23

Table 6: Holding Value of a Hypothetical Two Minute Portfolio Investor without Accounting for Dividend

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1999	100000													
2000	103570	10000												
2001	113296	109391	100000											
2002	108499	104760	95706	100000										
2003	94686	91423	83521	87191	100000									
2004	116529	112513	102788	107305	123130	100000								
2005	124693	120395	109990	114823	131756	107057	100000							
2006	132520	127952	116894	122030	140027	113777	106277	100000						
2007	131943	127395	116385	121499	139417	113281	105814	99758	100000					
2008	136043	131354	120001	125274	143749	116802	109103	102858	103108	100000				
2009	98839	95433	87185	91016	104439	84860	79266	74730	74911	72653	100000			
2010	105490	101854	93051	97140	111466	90570	84600	79758	79951	77542	106908	100000		
2011	117221	113181	103399	107943	123862	100642	94008	88627	88843	86165	118797	111121	100000	
2012	111056	107228	97961	102265	117347	95349	89064	83966	84170	81633	112549	105276	94740	100000

Table 7: Holding Value of a Hypothetical Two Minute Portfolio Investor with Dividend Reinvested

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1999	100000													
2000	105291	100000												
2001	118109	112174	100000											
2002	112696	107033	95417	100000										
2003	99354	94361	84121	88161	100000									
2004	127925	121497	108312	113514	128757	100000								
2005	140690	133620	119119	124840	141605	109978	100000							
2006	152741	145065	129322	135533	153734	119398	108566	100000						
2007	156201	148352	132252	138604	157217	122103	111025	102266	100000					
2008	164971	156681	139677	146386	166044	128959	117259	108007	105615	100000				
2009	124409	118158	105335	110394	125219	97252	88428	81451	79647	75413	100000			
2010	139837	132810	118397	124083	140746	109311	99394	91552	89524	84764	112400	100000		
2011	161179	153079	136467	143021	162227	125994	114563	105524	103187	97701	129555	115262	100000	
2012	158744	150767	134405	140861	159777	124091	112833	103931	101628	96226	127598	113521	98490	100000

Table 8: Holding Value of a Hypothetical TSX Composite Price Index Investor (No Dividend) Reinvested

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1999	100000													
2000	125148	100000												
2001	131387	104985	100000											
2002	116668	93224	88797	100000										
2003	102834	82170	78268	88142	100000									
2004	126538	101111	96309	108460	123051	100000								
2005	139496	111464	106172	119566	135652	110240	100000							
2006	174566	139487	132864	149626	169755	137955	125141	100000						
2007	197178	157556	150074	169008	191744	155825	141351	112954	100000					
2008	212483	169785	161723	182126	206627	167920	152322	121721	107762	100000				
2009	140886	112575	107230	120758	137004	111339	100997	80707	71451	66305	100000			
2010	181055	144672	137803	155188	176066	143083	129793	103717	91823	85209	128512	100000		
2011	204481	163391	155633	175267	198846	161596	146586	117137	103704	96234	145139	112939	100000	
2012	186266	148836	141769	159654	181133	147201	133528	106702	94466	87662	132210	102878	91092	100000

Table 9: Holding Value of a Hypothetical TSX Composite Total Return Index Investor (Dividend) Reinvested

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1999	100000													
2000	127068	100000												
2001	134947	106201	100000											
2002	121732	95801	90208	100000										
2003	109205	85942	80924	89709	100000									
2004	137066	107868	101570	112596	125512	100000								
2005	153736	120987	113923	126290	140778	112162	100000							
2006	195889	154161	145160	160918	179377	142916	127419	100000						
2007	226626	178350	167937	186167	207523	165341	147412	115691	100000					
2008	250307	196986	185485	205620	229208	182618	162816	127780	110449	100000				
2009	171265	134782	126913	140690	156829	124951	111402	87430	75572	68422	100000			
2010	227299	178880	168436	186720	208139	165832	147850	116035	100297	90808	132718	100000		
2011	263777	207587	195467	216686	241542	192445	171577	134656	116393	105381	154017	116048	100000	
2012	241451	190017	178923	198346	221099	176157	157055	123259	106542	96462	140981	106226	91536	100000

Table 10: Number of Years the Portfolio Holding Value of Two-Minute Portfolio Outperforms Benchmark Portfolio

	Two Min (No Div)/ TSX Price Index		Two Min (Div) / TSX Price Index		Two Min (Div) / TSX Total Return Index	
1999	0 of 13	yr	2 of 13	yr	0 of 13	yr
2000	5 of 12		8 of 12		5 of 12	
2001	4 of 11		4 of 11		4 of 11	
2002	0 of 10		3 of 10		1 of 10	
2003	1 of 9		2 of 9		2 of 9	
2004	0 of 8		0 of 8		0 of 8	
2005	0 of 7		0 of 7		0 of 7	
2006	0 of 6		1 of 6		0 of 6	
2007	1 of 5		2 of 5		1 of 5	
2008	1 of 4		2 of 4		1 of 4	
2009	0 of 3		0 of 3		0 of 3	
2010	1 of 2		2 of 2		1 of 2	
2011	1 of 1		1 of 1		1 of 1	

Table 11: Performance Measurement

	1999-2005	2005-2011	1999-2011
R_p	3.31%	-0.26%	1.03%
R_m	9.53%	6.55%	6.65%
Excess Return	-5.68%	-6.39%	-5.28%
p -value	(0.2885)	(0.1006)	(0.1361)
Jensen α	-1.14%	-4.30%	-2.70%
p -value	(0.7978)	(0.1241)	(0.3358)
σ_p	14.24%	15.84%	15.31%
σ_m	16.48%	21.42%	19.59%
β	0.4831	0.6510	0.5830
R^2	0.3125	0.7738	0.5551
Tracking Error	14.56%	10.61%	13.09%
Sharpe 2MPort	0.2324	-0.0164	0.0670
Sharpe TSXComp	0.5782	0.3057	0.3395
Treynor 2MPort	0.0685	-0.0040	0.0176
Treynor TSXComp	0.0953	0.0655	0.0665
Info Ratio	-0.4272	-0.6417	-0.4298
N	1761	1756	3267

Table 12: Mean Variance Optimizer Result 2011

PortReturn	PortRisk	Weight	Conserver										Aggres.
0.0005	0.0063	ABX.	0.0618	0.056	0.0473	0.0364	0	0	0	0	0	0	0
0.0007	0.0064	POT.	0	0	0	0	0	0	0	0	0	0	0
0.0009	0.0066	CP.	0	0.0061	0	0	0	0	0	0	0	0	0
0.0011	0.0068	MG.	0	0	0	0	0	0	0	0	0	0	0
0.0013	0.0073	TRI.	0.0183	0	0	0	0	0	0	0	0	0	0
0.0015	0.0082	L.	0.0057	0	0	0	0	0	0	0	0	0	0
0.0017	0.0095	WN.	0.0958	0.0672	0.031	0	0	0	0	0	0	0	0
0.0019	0.0110	RY.	0	0	0	0	0	0	0	0	0	0	0
0.0021	0.0127	BCE.	0.3492	0.3867	0.4213	0.4487	0.4404	0.3912	0.313	0.2048	0.0805	0	0
0.0023	0.0145	TA.	0.0429	0.0359	0.0136	0	0	0	0	0	0	0	0
		SU.	0	0	0	0	0	0	0	0	0	0	0
		TD.	0	0	0	0	0	0	0	0	0	0	0
		CNR.	0	0	0.0251	0.052	0.0687	0.0797	0.0793	0.07	0.0596	0	0
		CLC.	0.0735	0.0516	0.0237	0	0	0	0	0	0	0	0
		RCI.B	0.0705	0.0867	0.0959	0.1021	0.0868	0.0259	0	0	0	0	0
		CSU.	0.1531	0.1876	0.223	0.2622	0.3418	0.4637	0.5918	0.7252	0.8599	1	0
		ET.	0.0079	0	0	0	0	0	0	0	0	0	0
		FTS.	0.0706	0.0686	0.0598	0.0338	0	0	0	0	0	0	0
		CNQ.	0	0	0	0	0	0	0	0	0	0	0
		DR.	0.0508	0.0536	0.0593	0.0648	0.0624	0.0396	0.0159	0	0	0	0

Table 13: Correlation Matrix of Stock Holding in 2011

Stock	ABX.	POT.	CP.	MG.	TRI.	L.	WN.	RY.	BCE.	TA.	SU.	TD.	CNR.	CLC.	RCIB.	CSU.	ET.	FTS.	CNQ.	DR.
ABX.	1.00	0.02	0.02	0.09	0.13	0.19	0.15	0.11	0.06	0.15	0.35	0.13	0.06	-0.04	0.12	0.04	0.13	0.20	0.37	0.13
POT.	0.02	1.00	0.19	0.15	0.19	0.15	0.10	0.15	0.17	0.18	0.19	0.19	0.24	0.05	0.17	0.02	0.07	0.20	0.20	0.06
CP.	0.02	0.19	1.00	0.56	0.55	0.36	0.28	0.45	0.29	0.45	0.50	0.51	0.74	0.13	0.29	0.14	0.15	0.34	0.50	0.05
MG.	0.09	0.15	0.56	1.00	0.49	0.26	0.29	0.53	0.34	0.52	0.53	0.59	0.59	0.22	0.26	0.08	0.20	0.40	0.50	0.12
TRI.	0.13	0.19	0.55	0.49	1.00	0.47	0.32	0.53	0.36	0.48	0.49	0.56	0.57	0.17	0.42	0.08	0.12	0.49	0.46	0.02
L.	0.19	0.15	0.36	0.26	0.47	1.00	0.46	0.35	0.35	0.43	0.39	0.41	0.42	0.12	0.35	0.17	0.11	0.40	0.38	0.02
WN.	0.15	0.10	0.28	0.29	0.32	0.46	1.00	0.28	0.23	0.32	0.25	0.28	0.31	0.07	0.26	0.05	0.04	0.32	0.26	-0.01
RY.	0.11	0.15	0.45	0.53	0.53	0.35	0.28	1.00	0.39	0.54	0.56	0.82	0.57	0.18	0.37	0.07	0.15	0.50	0.53	0.13
BCE.	0.06	0.17	0.29	0.34	0.36	0.35	0.23	0.39	1.00	0.45	0.24	0.39	0.43	0.24	0.50	0.07	0.18	0.35	0.29	0.15
TA.	0.15	0.18	0.45	0.52	0.48	0.43	0.32	0.54	0.45	1.00	0.46	0.56	0.56	0.17	0.41	0.05	0.22	0.54	0.45	0.10
SU.	0.35	0.19	0.50	0.53	0.49	0.39	0.25	0.56	0.24	0.46	1.00	0.58	0.56	0.25	0.29	0.06	0.18	0.52	0.85	0.20
TD.	0.13	0.19	0.51	0.59	0.56	0.41	0.28	0.82	0.39	0.56	0.58	1.00	0.64	0.18	0.41	0.13	0.13	0.55	0.59	0.16
CNR.	0.06	0.24	0.74	0.59	0.57	0.42	0.31	0.57	0.43	0.56	0.56	0.64	1.00	0.20	0.46	0.13	0.11	0.43	0.56	0.06
CLC.	-0.04	0.05	0.13	0.22	0.17	0.12	0.07	0.18	0.24	0.17	0.25	0.18	0.20	1.00	0.15	0.05	0.09	0.28	0.26	0.24
RCIB.	0.12	0.17	0.29	0.26	0.42	0.35	0.26	0.37	0.50	0.41	0.29	0.41	0.46	0.15	1.00	-0.01	0.13	0.38	0.34	0.02
CSU.	0.04	0.02	0.14	0.08	0.08	0.17	0.05	0.07	0.07	0.05	0.06	0.13	0.13	0.05	-0.01	1.00	0.18	0.07	0.07	0.05
ET.	0.13	0.07	0.15	0.20	0.12	0.11	0.04	0.15	0.18	0.22	0.18	0.13	0.11	0.09	0.13	0.18	1.00	0.10	0.23	-0.02
FTS.	0.20	0.20	0.34	0.40	0.49	0.40	0.32	0.50	0.35	0.54	0.52	0.55	0.43	0.28	0.38	0.07	0.10	1.00	0.52	0.17
CNQ.	0.37	0.20	0.50	0.50	0.46	0.38	0.26	0.53	0.29	0.45	0.85	0.59	0.56	0.26	0.34	0.07	0.23	0.52	1.00	0.19
DR.	0.13	0.06	0.05	0.12	0.02	0.02	-0.01	0.13	0.15	0.10	0.20	0.16	0.06	0.24	0.02	0.05	-0.02	0.17	0.19	1.00

Table 14: Correlation of GICS Sectors Return in 2011

Sector	Energy	Materials	Industrials	Con Disc	Con Stap	Heal Care	Financials	Info Tech	Telecom	Utilities
Energy	1	0.3226	0.3236	0.5933	0.3846	0.293	0.6168	0.2027	0.3527	0.5744
Materials	0.3226	1	0.907	0.2126	0.205	0.0861	0.2137	0.1065	0.2177	0.2753
Industrials	0.3236	0.907	1	0.3305	0.2335	0.0959	0.3209	0.0982	0.3039	0.3371
Con Disc	0.5933	0.2126	0.3305	1	0.4125	0.1984	0.6594	0.1995	0.4269	0.6097
Con Stap	0.3846	0.205	0.2335	0.4125	1	0.0637	0.4011	0.1228	0.3947	0.4859
Heal Care	0.293	0.0861	0.0959	0.1984	0.0637	1	0.2151	0.0622	0.1779	0.2508
Financials	0.6168	0.2137	0.3209	0.6594	0.4011	0.2151	1	0.1658	0.4709	0.6397
Info Tech	0.2027	0.1065	0.0982	0.1995	0.1228	0.0622	0.1658	1	0.1499	0.1761
Telecom	0.3527	0.2177	0.3039	0.4269	0.3947	0.1779	0.4709	0.1499	1	0.5193
Utilities	0.5744	0.2753	0.3371	0.6097	0.4859	0.2508	0.6397	0.1761	0.5193	1

Table 15: Number of Years A Stock Has Been Included in the Two-Minute Portfolio During 1999 to 2012 (Max: 14 Years)

Con Disc		Con Stap		Energy		Financial		Heal Care	
MG.	9	L.	14	CNQ.	3	BNS.	3	CLC.	6
SJR.B	5	SC.	5	ECA.	8	MFC.	4	DR.	1
TRI.	14	WN.	9	IMO.	9	RY.	14	NDN.	10
				SU.	7	TD.	7	VRX.	5
				TRP.	1				
Industrial		Info Tech		Material		Utilities		Telecom	
BBD.B	6	CRY.	4	ABX.	14	CU.	6	BCE.	14
CNR.	11	CSU.	5	G.	1	FTS.	5	RCLB	7
CP.	11	CTY.	5	POT.	12	TA.	13	T.	7
		ET.	4	TCK.B	1	VNR.	4		
		MDA.	1						
		SO.	1						