Momentum Investment Strategy
(An Empirical Study of the Canadian Stock Market and the Swedish Stock Market)
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Abstract

Market efficiency is a highly debated topic within the academic research field of finance. Several studies have presented that the return on stocks may be predictable by employing the momentum investment strategy, which contradicts the Efficient Market Hypothesis in exchange market. There is extensive international evidence, on an academic level that the momentum investment strategy yields positive abnormal returns when short-term periods are considered. This paper examines the profitability of the momentum investment strategy in Canadian and Swedish stock markets during January 2000 to December 2006. To investigate the strategy, two separate portfolios of winners and losers, each portfolio containing 50 stocks, are created for each market. Then the momentum strategy, which consists in long position in past best performing stocks and short positions in past worst performing stocks, is run for each exchange market. Results show that the strategy generates statistical significance at the 5% level for Canadian market for 9-month holding period, and with the level of significance at the 10% for Swedish market for the 6 and 9-month holding periods after excluding the data for the year 2002. Moreover, results show that the strategy is even stronger in the level of significance during the bull trend of the markets. The paper confirms the existence of the momentum anomaly in TSX and SSE.
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1. Introduction

The chapter provides for the reader an introduction to the research area of momentum investment strategy. The background aims to guide the reader to the research questions and the fundamental purposes of the study. The chapter will continue to define some frequently applied terms and shows a brief structure of the thesis.

1.1 Background

The main goal for an investor is to generate an appropriate return on the invested capital. Investors usually apply a variety of investment techniques and strategies by choosing their own appropriate interest of different time horizons, some probably extremely focused on short term gains horizon, whereas others maybe interested in long term invested alternatives. Research in the area of stock market efficiency reveal that stock returns may be predictable in some degree, which is against of well-established efficient market hypothesis (EMH).

In recent years, practitioners and academic researchers have found that some simple trading strategies based on past cross-sectional stock returns present significant abnormal profits. Momentum portfolio strategy, which involves having long positions in past best performing stocks (winners) and having short positions in past worst performing stocks (losers), has been proven to achieve significant positive profits in the medium term of 3 to 12 months. In contrast, a systematic reversal effect is found when a longer holding period for more than 3 years is considered, and reversing the momentum strategy (i.e., buying past losers and selling past winners) results in production of profitable contrarian profits. These empirical findings, originally reported for the U.S. market in two important articles by De Bondt and Thaler (1985) and Jegadeesh and Titman (1993) and supported by other works in this area of research, turned out to be particularly challenging in their crucial undermining of the core concept of market efficiency. Hence, in the following years, a critical understanding of these “anomalies” has become even more urgent, while two main directions have been taken by academics researches.
Empirical financial literature reports evidence of prediction of securities returns based on past information, in contradiction to the efficient market hypothesis. Jegadeesh and Titman (1993) show that a momentum strategy generates return of approximately 1% per month over the six subsequent months in US markets. Conversely, a long-term contrarian strategy based on a performance observed two to five years earlier generates positive returns of nearly 8% per year in the following years.

Although there are several different stock markets in the world, many researches within the field of finance and investment have focused on the New York Stock Exchange and the National Association of Security Dealers Automated Quotation System (NASDAQ). It seems interesting to investigate and have a compare of two other international stock markets, the Toronto Stock Exchange and the Stockholm Stock Exchange. The reason for this selection of markets is due to the purposes of having an investigation among the Canadian market, which in behaviours and rules follows the same structure and trend as U.S., the Swedish is to serve as a sample of one of the European markets, which this area of research has not been tested for this market before. Since the study is conducted on the Toronto Stock Exchange (TSX) and Stockholm Stock Exchange (SSE), there is a chapter included in this paper about TSX and SSE, which will serve as background information to guide the reader.

The paper examines the presence and profitability of the momentum investment strategy in two different markets, Canada and Sweden, following bull and bear markets for the periods of 2000-2006.

### 1.2 Research questions

1. Can traders earn abnormal profits by applying the momentum investment strategy? (An examination of TSX and SSE)

2. Are momentum profits stronger during bull or bear market? (An examination of TSX and SSE)
1.3 Purpose

The purpose of this work is to examine the profitability of momentum strategy following bull and bear markets in TSX and SSE markets. This study investigates the existence of the momentum investment strategy in these two markets. If the investigation proves the strategy exists, then it defines that the market efficiency is not kept. Furthermore, the paper is to analyse whether the state of the market (bull or bear) influences the profitability of the strategy.

1.4 Definitions

The following words and phrase are applied frequently in the work and therefore are defined below.

**Abnormal return:**
When the return on an asset or security is in excess of the expected rate of return.

**Bear market:**
An extended period followed by extensive pessimism in which investment prices drop. Bear markets usually take place when the economy is in a recession and unemployment rate is high, or when inflation is boosting rapidly.

**Bull market:**
An extended period in which investment prices increase faster than their historical average prices. Bull markets occur by reason of an economic boom, an economic recovery, or investor psychology.

**Contrarian investment strategy:**
Involves selling previous winner stocks and buying previous loser stocks.
**Cumulative abnormal return (CAR):**
Sum of the differences between the expected return on a stock and the actual return.

**Cumulative return (CR):**
Sum of the actual returns.

**Market anomalies:**
A price distortion on a financial market.

**Momentum investment strategy:**
Entails long positions in past best performing stocks and short positions in past worst performing stocks.

### 1.5 Disposition

The upcoming chapters in this work are structured in the following way, same as the general guidelines for research papers that have been done in this field of study.

### 2. The Stock Market Exchange and Index

The purpose of this chapter is to bring a clear view to the reader with information regarding to the briefly describing of the function of stock market and index, the chapter describes a brief history of the TSX and SSE, Following by introduction of some relative information of the markets.

### 3. Literature review

This chapter contains theories that are related to the subject area. It is to prepare, and guide the reader for following the methodology, results, and conclusion parts. In this part, I provide you with a comprehensive review about the related theories following by explanations and comparisons of the previous studies in this area.
4. Methodology
This chapter describes to the reader the methodological approach that is applied for this study with a performance of chronological work order. In this part, it is given a detailed description of the method in order to facilitate future replications of the study.

5. Results
The results of the study are shown in this part. The results are explained and discussed continuously throughout the chapter by applying some proper tables, which help the reader to have a better vision of the results.

6. Conclusions
The conclusion part is provided to answer the research questions of the work. Some comparisons of the this study by the previous studies are provided in this chapter, as well as possible topics and ideas for further research within the area of investment strategy in different horizon and stated of markets.
2. Stock Market Exchange and Indexes

The Exchange has an important role in assisting in the applying of capital and in the preserving of a highly effective secondary market for new enterprises. Moreover, the stock exchange works for established companies as well. Exchange listings scope from junior mining, oil, and industrial sectors to highly matured international companies. The Exchange keeps listing requirements for the different firms, in order to accommodate companies with a variety of size and field of activity, while simulates checking for meeting the certain basic standards.

A stock market index is a listing of stock. The composite value of the components is also reflected in an index. It is applied as a basic tool to demonstrate the features of its component stocks, which has some commonality, for instance trading on the exact same stock market exchange, or possessing similar market capitalizations, having the same industry. News and financial services firms compile many indices as a benchmark for measuring the performance of their portfolios, such as mutual funds.

2.1 The Toronto Stock Exchange

The Toronto Stock Exchange (TSX) is the largest stock exchange in Canada, the third largest in north region of America, and the seventh largest in the world. A wide range of businesses from Canada, the United States and other countries are displayed on the exchange. The market is owned and run by TSX Group for the purpose of trading senior equities. The Toronto Stock Exchange acquired the Canadian Venture Exchange Inc. in 2001. TSX involves the Toronto Stock Exchange, TSX Markets, TSX Venture Group, and TSX Datalinx. The approximate trading of 1300 senior equities presents TSX as the largest stock exchange in the country. As well as conventional securities, the exchange lists different investment funds, exchange-traded funds, and income trusts.

The Canadian exchange is an important exchange market due to the country’s economy being highly dependent on trade and business with the United States. Canadian firms relate and refer
to the U.S. business and financial markets to raise capital and on the other hand, U.S. firms refer and turn to Canadian market for financing and business affairs and opportunities.

2.1.1 The TSX Index (S&P/TSX Composite Index)

A collection of equities, indexes or other financial factors combined in a standardized method, presenting a useful and practical statistical measure of whole the market or a specific performance along the time, known as a composite. Commonly, a large amount of factors and indicators which are averaged together to present an output representative of a whole market or sector in a proper way is in a composite index.

The S&P/TSX Composite Index is a list of the largest companies by market capitalization on the TSX. The TSX listed companies in this index contains of the approximate 71% of market capitalization for all Canadian-based companies listed on the TSX (TSX, 2008:1).

![S&P/TSX Composite Index Graph](image)

Figure 1: S&P/TSX Composite Index 1999-01-31 – 2007-12-31(Thomson DataStream, 2008:1)

2.2 The Stockholm Stock Exchange

The Stockholm Stock Exchange (SSE) is the primary securities exchange of the Nordic countries in the region, which located in Stockholm, Sweden. Trading was operated on the floor of the Stockholm Stock Exchange former to the launching of electronic trading on June 1, 1990. SSE was acquired by OMX in 1998, and then the operations were merged with those of the Helsinki Stock Exchange in 2003. SSE is a main sector of the financial infrastructure of
the country, which is the central marketplace for trading in shares and other financial instruments.

2.2.1 The SSE Index (AFGX)

Affärsvärldens General Index (AFGX) is the oldest index in Sweden. The historical values of the index have been re-formed later beginning from the year 1901, when Affärsvärlden newspaper was launched. The stocks in the index are weighted based on their market value, the value weighted method. AFGX measures the market average on SSE, which is highly demanded by the Swedish portfolio managers to employ it as a reference in the portfolios’ performance.

Figure 2: Affärsvärldens General Index (AFGX) 1999-01-31 – 2007-12-31 (Thomson DataStream, 2008:1)
3. Literature Review

In this part, the research literature review, which is related to the study, is presented. First, the reader is given a description of the Efficient Market Hypothesis, following by a description of different kind of anomalies, which exist in the market. However, they should never be present in a truly efficient market. In this part, also, it is mentioned to the previous research and their results related to this theoretical part.

3.1 The Efficient Market Hypothesis

The efficient market hypothesis states that it is not possible to consistently outperform the market by using any information that the market already knows, except through luck. Information or news in the EMH is defined as anything that may affect prices that is unknowable in the present and thus appears randomly in the future.

The efficient market hypothesis indicates that since market prices reflect all available and accessible information, containing information about the future, the only difference between the stock prices at time t and time t + 1 are phenomenon that impossibly can be predicted.

Fama (1970, p383) describes market efficiency as:
“A market in which firms can make production-investment decisions, and investors can choose among the securities that represents ownership of firms’ activities under the assumption that security prices at any time “fully reflect” all available information.”

Bodie et al. (2006) divide the market efficiency in three levels:
- The weak form hypothesis affirms that all information that can be arisen by examining market trading data is reflected previously in stock prices; like as trading volume, the history of past prices, or short interest.
- The semi strong form hypothesis asserts that all publicly accessible information considering the prospects of a company must be mirrored in the stock price in advance.
The strong form hypothesis states that stock prices reflect all the relevant information of a company, even information that are available and accessible only to company insiders.

In order to conduct an interpretation and explanation of these three different levels of EMH, it is important to know that:

### 3.1.1 Weak form of market efficiency

The weak form EMH anticipates that current stock prices fully reflect all security market information, containing the historical order of prices value, rate of return, volume of trading, and other market information. This theory assumes that since in current market stock prices already reflect all historical past returns and market information, and then there should be no historical data such as past rates of return relationship with future returns. Hence, the hypothesis claims that it should be gained not significantly by applying any trading rule that has a policy of buying or selling a security under the past rate of returns or any other related market information (CFA program curriculum, 2007; Bodie et al, 2006).

### 3.1.2 Semi-strong form of market efficiency

The semi strong form states that prices of securities adjust quickly to the published of all public information, which means the present stock prices fully reflect all public market information. The hypothesis indicates those who put their decision s on any important current data just after it has been public should not gained above-medium risk adjusted total returns from their trade, taking into account the cost of transaction since the security price has reflected all relevant new public data, already. The second level of this theory includes comprehensively the weak form of EMH, since the weak form hypothesis considers whole the public market information like as rate of return, stock prices, low and high trading volume. Market public information contains all nonmarket information, for instance price-to-earnings ratios, earning announcements, dividend announcements, price-book value ratios, dividend
yield ratios, economical and political news, stock splits, and so on (CFA program curriculum, 2007; Bodie et al, 2006).

3.1.3 Strong form of market efficiency

The strong form EMH indicates that the stock prices fully reflect all public and private information. In this level of market efficiency no group of investors have exclusively access to the relevant information of prices formation. Hence, the hypothesis contends highly that none of the investors in the market should be able to gain above average risk adjusted rate of return, constantly. This level of EMH covers the first and the second level of this theory. Moreover, the strong form EMH expands the theory of efficient markets that the security prices adjust quickly to the new public market information that is relieved. In this market all information are free of charge and available for everyone at the same time (CFA program curriculum, 2007; Bodie et al, 2006).

3.2 Function and application of EMH in market

Several research papers have established that former identification of new information can produce fairy large profits. Hence, Insiders who trade based on privileged information can gain abnormal returns, violating the strong form of the efficient markets hypothesis. Prior, it has been mentioned that an efficient market is one where the prices of securities fully reflect all available information; then, the question is that what are the adequate conditions for capital market efficiency? In an idealized circumstance, such conditions would be (Dimson and Mussavian 1998);

- Trading of the securities is performed without transaction costs.
- All available information is accessible to all market participants free of charge.
- All participants agree on the entailment of current information for the current price and dissemination of future prices of each security.
However, such a smooth market does not exist in reality, and commonly in any market there will be a combination of transactional costs, costly information, and disagreement regarding to the information.

In a study by Block (1999), respondents are asked to state their acceptance or rejection of the efficient market hypothesis (EMH), which in vast (semi-strong) form proposes that public information is confined in the current price and any extra analysis by an individual analyst is probably create an insignificant added value in the price. The EMH was primitively considered in the 1960s, and it has been under severe examination since then as researchers declared to specify anomalies in towards every area of investments. As table 1 displays, nearly 100 percent of practicing analysts in the study are neutral or strongly disagreed with the EMH.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>8</td>
<td>2.7</td>
</tr>
<tr>
<td>Neutral</td>
<td>101</td>
<td>34.2</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>186</td>
<td>63.1</td>
</tr>
<tr>
<td>Total</td>
<td>295</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Following, when respondents were asked about the most substantial variable in specifying portfolio returns, presented in table 2, more than 60 percent of the respondents selected the skill and training of the portfolio manager as most important factor. Regardless the emphasis on the risk factor, which commonly observed in academic researches, risk in the portfolio approached about half a percentage of skill and training. The rate of trading in the portfolio came in the last. The responses are mostly along with the rejection of the EMH presented in Table 1 (Block 1999).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill and training</td>
<td>179</td>
<td>60.3</td>
</tr>
<tr>
<td>Amount of risk</td>
<td>116</td>
<td>39.1</td>
</tr>
<tr>
<td>Amount of trading</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>297</td>
<td>100.0</td>
</tr>
</tbody>
</table>
3.3 Anomalies

The discussion about market efficiency has resulted in thousands of empirical studies and literatures trying to indicate whether particular markets are efficient, moreover if so to what degree. The random walk theory indicates that price movements will not follow any trends and so by knowing the past price movements it is not possible to predict the future price movements. However, many other researchers have exposed many stock market anomalies that seem to be inconsistent with the efficient market hypothesis (e.g. De Bondt et al 1985 and 1999; Forner et al 2003; Harris 1986; Jegadeesh and Titman 2001; Haugen and Philippe 1996; Fama and French 1992; Dharan and Ikenberry 1995).

There is no way to make abnormal returns constantly by applying a trading policy strategy beyond on an available set of data and related information by existent of an efficient market. The assumption surely is derived based on:

- Cost-less access to new available information for everyone,
- The investors’ experts in their field, and
- They are aware about the process of market and suitably modify their holdings.

Just before the late 1970s, several empirical studies and researches supported the aspect of informational efficient of the capital market. Several models linked to security valuation have been worked on the theory of capital markets’ informational efficiency. Although in the late 1980s research questioning presented the strength and validity and pointing on different types of anomalies that are related to the efficiency of capital market. Many studies displayed the possible trading strategies achieving abnormal rates of return by applying the past-related historical data combined with publicly available information rejecting the efficiency of capital market. Studies proof that there are factors that can be directly related to the inefficiency of a market. These factors are:

- The January effect (stocks have higher returns during this month),
- Size effect (small companies generate higher return than large companies),
- B/E effect (low P/E have higher returns than higher P/E),
- B/M or B/P (high B/M or B/P have high returns).
Bid-ask spreads (as a signal of specific news),
The persistence of technical analysis such as contrarian and momentum strategies.

Following is an overview of some recognizes anomalies, categorized into four main groups: calendar anomalies, fundamental anomalies, technical anomalies, and others.

### 3.3.1 Calendar anomalies

One of the most debated anomalies is the January Effect. Stocks commonly have generated abnormally high returns over January. The January Effect seems especially intriguing due to its presentation and being publicized for around two decades. The effect is normally assigned to small stocks rebounding, resulting the year-end tax selling (Haugen and Philippe 1996).

The Monday effect works in the same way as the above anomaly. Monday performs as the worst day for investors to invest in equities. Many studies and researches have revealed that stocks returns on Monday are performs worse than other days of a week. One of the researches on intra-day trading which has been examined by Lawrence Harris (1986) shows the weekend effect tends to happen in the first 45 minutes of trading as prices decline, on the other hand on all other days prices go up over the first 45 minutes.

Another interesting calendar anomalies effect on the market is the Turn of the Month Effect. Equities consistently present higher rate of returns on the last day of a month and the first four days of a month.

### 3.3.2 Fundamental anomalies

Fundamental analysis pay attention on economic information that their decisions based on the examination of an industry, economy, and some other variables of the company that guide the analyst to have an estimate of intrinsic value of his invest.

The most common fundamental anomalies are related to stocks with low price to book ratio. An academic research on the performance of low price to book value stocks by Fama and
French (1992) for the period 1963-1990 included almost all the stocks on the AMEX, NASDAQ, and NYSE. The paper shows that the lowest book/market stocks outperformed the highest book/market stocks 21.4% to 8%. The explanation is mentioned that the price of the stocks does not present their intrinsic value.

### 3.3.3 Technical anomalies

Technical analysis In contrast to the efficient market hypothesis (EMH) and fundamental analysis, involves the investigation of past market information such as trading volume and prices of stocks, that leads to an estimate of forthcoming price trends.

Neglected stocks usually are selected by the investors who certainly conduct a contrarian strategy of buying these certain of stocks in their portfolios. A study by De Bondt and Thaler (1985) examined the 35 best and worst performing stocks on the New York Stock Exchange (NYSE) during the period 1932-1977. The study shows that the best performers during the previous period afterward underperformed, while the poor performers from the previous period generated significantly higher returns than the index.

While, the momentum strategy as a kind of anomaly in the stock market entails long positions in past (historical) best performing stocks and short positions in past (historical) worst performing stocks. The main challenge to technical analysis is relied on the results of most of the academic empirical researches of the efficient market hypothesis. After taking account of transaction costs, for technical trading principles to provide better risk-adjusted returns, the capital market would act slowly to adjust prices of equities to the coming new data, which shows that market has to be inefficient. This is pointed as the weak-form efficient market hypothesis (as it mentioned in level one prior of this chapter).

### 3.3.4 Other anomalies

IPOs, size effect, stock buyback, and seasoned equity offerings are counted as other anomalies in the market. It has been presented that Initial Public Offerings (IPOs) in total under-perform in the capital market.
Dharan and Ikenberry (1995) have presented in their papers that firms listing their stock on the AMEX and NYSE for the first time consequently under-perform the market. Loughran and Anand (1997) have found in their paper that acquisition completing stock mergers highly under-perform the capital market as well, while companies that finalize cash tender offers usually outperform the capital market.

3.4 Momentum strategy

Empirical researches have contributed remarkable credibility to trading strategies like as; buy and hold strategy, momentum strategy, and contrarian strategy, which have been conducted in financial markets. In 1980s, an influential challenge occurred in the paper of De Bondt and Thaler (1985), examine the contrarian strategy over a long period, then Later, Jegadeesh and Titman (1993) present the significant and stable profitability of the momentum strategy at the horizon of 6-month holding period. Hence, it is not strange that the return generated by the momentum investment strategy has become the most debated academic topic. The market efficiency is violated by the persistence of such strategies in the market.

De Bondt, Schiereck, and Weber (1999), have examined on a larger sample of stocks. Their paper shows that the profitability of this strategy is significantly related on the length of the ranking period. Schmitz et al. (1994/1995) discovered the existence of same strategy in market regarding Canadian stocks data for duration of 1978-1993. The study presents even stronger results of the momentum strategy.

Only a few researches have been conducted the momentum investment strategies outside the United States. Strong, Xu, and Lio by following the methodology of Jegadeesh and Titman investigated the profitable momentum investment strategies in the United Kingdom exchange market.

From a psychological perspective, this behaviour in the stock returns has been interpreted. The interpretation states that the abnormal returns performed by momentum trading strategies should be in accordance with an under-reaction hypothesis of prices to current news; in fact,
the new information in market might be gradually associated to the stock prices. Hence, they perform significantly positive autocorrelations during these holding periods (Forner and Marhuenda 2003).

The overreaction hypothesis related with the contrarian strategy and the under-reaction hypothesis related with the momentum strategy are not necessarily contradictory, while they can be entirely compatible with each other. It assumes that the investors do not react promptly to news on an isolated event in the under-reaction hypothesis, which means after-event prices keep on to follow the same negative or positive sign. While, the overreaction hypothesis, explains that while the investors reply with excessive optimism or excessive pessimism on a set of good or bad news exposes, their primary overreaction eventually induce a reversal trend on the prices. The reverse takes place when later the investors realize that the market prices are deviated from their fundamental values by their trade behaviour (Forner and Marhuenda 2003).

Surprisingly, no previous research explicitly investigates momentum in the context of two different markets such as the TSX and the SSE. Neither has any research has examined the momentum strategy in SSE before.

### 3.5 Bull and Bear market

Many market analysts and market investors apply technical analysis strategies to investigate whether a market is experiencing in a bull or bear condition, in order to perform market-trading strategies to exploit and predict the trend. Indeed, they assume that financial markets and equities have cyclical trends and move in and out of bull and bear market condition regularly.

The preferred choice for an investor in the stock market during a bull market is to take profit of rising prices by buying stocks in the beginning of the trend and then selling them when the prices have achieved to the maximum point. Investors usually have a talent on recognizing that the market is going up, a bull trend; however, determining precisely about the occurrence of the bottom and peak of a market is impossible. As prices have an upward trend, any losses should be negligible and temporary. In a bull market, investing in the market generates high
return, an investor can conduct an actively and confidently invest in equities with a higher probability of generating return.

Investing in a bear market has a higher chance of losing money, since prices are constantly losing their value. Even if an investor willing to invest with a prediction of an upturn in the market, he is likely to loss in his investments before an occurrence of turnaround in the market. Hence, the better choice on a bear market will be found in investing in safer investments like as fixed-income or short selling. While in bear condition, while also some stocks are defensive stocks, which are only minimally affected by the trend of a market, therefore they are stable in gloom and boom of a market. The fact is that they are industrial stocks such as utilities, which usually owned by the state and they produce essential products for people to buy regardless of the economic mode.
4. Methodology

The theoretical analysis tools relevant for this study will be explained in this section. After the introduction of the EMH theory and stock anomalies in the previous chapter, in this part, a chronological work order is applied in order to study the momentum strategy on TSX and SSE market. First, an introductory discussion regarding the scientific initial points and their attributions for the study is presented. Then calculating the residual returns on each stock is demonstrated, and later explained how the portfolios of winners and losers groups are formed and created. In final step, mathematical and statistical procedures are employed that indicates the efficiency of the momentum strategy in the markets. The method applied in this paper is the same method that has been extensively used in this topic area.

4.2 Research philosophy

The positivism and phenomenology are two kinds of research philosophies. The presupposition of positivism is that the researcher is independent; the subject cannot affect him. The research implies the role of an objective analyzer; the methods conducted are highly structured and finalized in quantitative form. The phenomenologist discusses about the reality situation of the research subject (Remenyi et al. 1998).

According to the thesis purpose, the paper is conducted using the positivistic research method. Gathering monthly stock price data organized in portfolios from the basis of my study. These portfolios are ranked, the result is based on the outcome of statistical analysis of the portfolios. Considering the nature of the research area, a positivistic epistemological approach satisfies the research questions with adequate reliability.

4.3 Research approach

The induction approach is forming theory through the research process. It considers the affairs and cases that have happened. Therefore, it is a better choice to examine a small sample of
subjects, and then in the next step comprehend the problem. Commonly, the deduction approach examines or develops a theory. Three main characteristics of deduction approaches are (Saunders et al. 2000):

- The researchers define causal links and relationships of variables,
- The researches are independent, and
- The collected or downloaded data is usually in a quantitative form.

The main idea behind this study is to test the level of EMH in TSX and SSE markets by examining the two exchange markets using the momentum investment strategy. The aim is to see if investors can get abnormal return. Obtained results will be tested by a statistical t-test for the period 2000.1.1-2007.09.31. In this study, data is analyzed to test the momentum strategy and further the EMH; the study is based on a deductive approach.

There are several research methods to apply when running a research. Among them, there are two methods; the qualitative and the quantitative method that are more important in research area. The qualitative method is applied when mostly the researcher desires to have a better and clear understanding of a research problem. In this method, all data gathered comes from only a few research units. The purpose of the researcher is to achieve an aggregate view of the context of the research problem. The main qualitative methods have a wide scope from case studies, participant observation ethnography, biographical method, and ethnomethodology to interviewing. The method is useful and applicable when a description and explanation of a problem is needed. On the other hand, quantitative methods are research methods referring to numbers, digits, and anything that is measurable. Measuring and Counting are normal and clear forms of quantitative methods. Hence, this method is totally distinguished itself from the qualitative method. The outcome of the research is a number, digits, or a series of numbers. A statistical and mathematical process, which is needed for this kind of research method. These figures are often displayed in tables, graphs, diagrams, or other forms and shapes of mathematics and statistics. The research method for this thesis is quantitative method, the most common method, which has been applied in this topic area. (The software tool for this thesis is SPSS and Excel after downloading data.)
The order applied for writing and working on this thesis complies the regular research process. The structure is like common research articles in this field, Common procedure guidelines for articles of financial and accounting have been applied.

4.5 Data

Data for this study is gathered from the Thomson DataStream database, the world’s largest historical financial database. Access to the database is presented by the library of the Umeå University (UB) and is accessible to all students studying at Umeå School of Business and Economics.

Monthly closing prices adjusted for dividends, splits, and seasoned equity offerings and market values of each company that are trading on the TSX and SSE during the period of January 2000 to September 2007 are downloaded. The cause of the chosen period is due to focusing on the efficiency of the markets in the recent years, moreover investigating the beneficiary of the momentum strategy during the last few years in market, a total of 96 months.

The number of stocks for TSX in the sample range from 849 to 1347 during the period analyzed, and the number of stocks for SSE in the sample range from 180 to 297 during the period analyzed. For a given stock to be included in the sample, it must be traded constantly for the 12 months prior to the formation period, and must then have been traded at least once during the following 12 months (the test period). Excluded firms are ones which are trading below C$20 million for TSX stocks and SEK130 million for SSE stocks in market capitalization value to certify illiquid or small stocks do not have any effect on the results and analyze; avoids for survivorship bias.

As a market index, I used S&P/TSX Composite Index for TSX market and Affärsvärlden general index (AFGX) for SSE market.
4.6 Research design

The main idea behind the under-reaction hypothesis is the likelihood of the stock prices deviate systematically from their own intrinsic values. Hence, by applying the available information of their past returns then most likely, the direction of their price trend can be predicted to some level. This study focuses on the stocks that have performed extreme positive or negative residual returns during a 12-month holding period. Then two groups of portfolios are created, one for the winners group and one for the losers. Later, the performance of the portfolios is analyzed for the following T months (T = 3, 6, 9). However, before proceeding, a scientific method must be specified to calculate the residual returns in the portfolios. Among the finance literature in this area the most popular methods, which is commonly employed, is market-adjusted excess returns.

Beginning from the end of January 2000 (the formation date, t=0), I will first gathered the cumulative market-adjusted returns for during the previous 12 months (the formation period) for each stock after calculating the monthly stock returns by applying the equation (0). The process is defined below:

\[
\frac{MCP_t - MCP_{t-1}}{MCP_{t-1}}
\]

where:

\(MCP\) = monthly closing price

\[
CU_j = \sum_{t=-12}^{0} (R_{j,t} - R_{M,t})
\]

\(CU_j\) = cumulative market-adjusted return on the stock \(j\), \(R_{j,t}\) = the return on the stock \(j\) for the month \(t\), \(R_{M,t}\) = the market-index return.
Equation (1) is the simply cumulated AR through time, while equation (2) is equivalent to a buy and hold return. The method used for calculating the average returns for a specific period is a tactful issue, which could be the main sources of many anomalies in the market, especially when returns of the long terms are considered. The returns, which are calculated by considering the closing prices, are mostly upwardly biased due to the bid-ask bias effect. Depending on the method used in calculating the long returns, this kind of bias could change the face of normal results to seem abnormal. However, the majority of this bias is removed when the returns considered to a buy-and-hold method. Hence, equation (2) is employed to obtain the cumulative abnormal return (CAR).

Then the observations of all the stocks will be classified, from the lowest to the highest CU return, thus creating the winner and loser portfolios are classified. The 50 stocks with the highest CU are allocated to the winner (W) portfolio and the 50 stocks with the lowest CU to the loser (L). The amount of stocks in each portfolio has been chosen due to the average common way of creating portfolios among other researches. Subsequently, the CAR, on both winners and losers portfolios are calculated for the T-month durations (T = 3, 6, 9). Which means if a portfolio is created in the year 2000, then equation (4) is applied, in order to calculate the CAR for the duration of the holding period (the year 2001). The trend is repeated 7 times between the years 2000 to 2006. In order to calculate the CAR there are two different methods which are defined by equations (3) and (4). The equation (4) is applied for the study because of the same bias that exists for the equation (1); as discussed above.

\[
CU_{j,\text{H}} = \left[ \prod_{t=12}^{0} (1 + R_{jt}) - 1 \right] - \left[ \prod_{t=12}^{0} (1 + R_{Mt}) - 1 \right]^{1}
\] (2)

\[
CAR_{p,t} = \sum_{T=1}^{T} AR_{p,T} = \sum_{T=1}^{T} \sum_{j=1}^{n} \frac{1}{n} \left( R_{j,t} - R_{M,t} \right) \quad t = 3, 6, 9
\]

\[ P = L, w \]

n = the number of stocks in each portfolio, ARp = the abnormal returns on a portfolio.

\[ ^1 \text{The } \Pi \text{ sign multiplies all the numbers given as arguments and returns the product.} \]
\[ CAR_{p,t}^{B&H} = \frac{1}{n} \sum_{j=1}^{n} \left[ \frac{1}{T=t} \prod_{T=t}^{t} (1 + R_{jT}) - 1 \right] - \left[ \frac{1}{T=t} \prod_{T=t}^{t} (1 + R_{Mt}) - 1 \right] \quad t = 3, 6, 9 \quad (4) \]

\[
p = L, W
\]

If an under-reaction persists in the market, then the following result are expected to occur during the test period:

- \( CAR_{W,t} > 0 \) \quad t = 3, 6, 9
- \( CAR_{L,t} < 0 \) \quad t = 3, 6, 9
- \( CAR_{CE,t} = CAR_{w,t} - CAR_{l,t} > 0 \) \quad t = 3, 6, 9

This inequality presents the CAR on the zero-investment portfolio strategy employed in the momentum strategy. Table 3 displays briefly the experimental model of the process, which has been discussed earlier in this chapter.

<table>
<thead>
<tr>
<th>Table 3: The experimental model of the process</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAR During the Test Period</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Portfolio</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Momentum Strategy:</td>
</tr>
<tr>
<td>Winners</td>
</tr>
<tr>
<td>Losers</td>
</tr>
<tr>
<td>Winners-Losers</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
4.5 Testing the results

Hypothesis testing is commonly applied in order to test a theory with a statistics approach. Statistical hypothesis testing applies and examines data to declare whether a certain statement, called the null hypothesis, is true or not. One may be encounter with the problem of making a certain decision regarding to an uncertain hypothesis. A statistical hypothesis test is an algorithm to elect between the alternatives (for or against the hypothesis) which reduces particular risks. In a situation of accepting the null hypothesis then the theory is normally supposed to stand, while if the null hypothesis is not accepted then the null-hypothesis is rejected.

When performing a t-test one first defines the test’s null and alternative hypothesis. In this study if the momentum strategy exists significantly in market then it presents that the market is not hold efficiently, so the null-hypothesis will be rejected (the alternative hypothesis is kept). On the other hand, if the existence of Momentum investment strategy is not proven, then it is the indicator of efficiency of the market in the weak form. The null and the alternative hypothesis are defined as follows:

- $H_0$: The momentum strategy does not exist $\rightarrow$ The market holds efficient
- $H_1$: The momentum strategy exists $\rightarrow$ The market is not efficient

The test represents the validity of the results in this aspect. The momentum strategy is tested for statistical significance, by examining both the winner sample and the loser sample portfolios. The test displays whether observed abnormal returns in this strategy could have occurred by chance (accident) or if they can be expected to happen by employing the momentum strategy. A small probability value is the indicator of rejecting the $H_0$ hypothesis. The obtained results are tested at a 5% and 10% level of significance in this paper. If the null hypothesis is rejected at a level of 5%, the null hypothesis is implicitly rejected at a 10% level of significance as well. However, a rejection level of 10% does not imply that the 5% level of significance is rejected.

In chapter 5, first a statistical t-test for the period 2000-2006 is conducted. Later in the chapter, in order to investigate the effect of the bull and bear market on the momentum
strategy, the year 2002 is excluded from the obtained data; therefore, the statistical t-test is conducted once again.

4.6 Credibility criteria

The research credibility has an important role in the research area. Some criteria can be applied in order to analyze the credibility of a research. These criteria are: reliability, replication and validity (Bryman and Bell 2003).

4.6.1 Reliability

In order to enable the readers of the research to judge the credibility of the study, some possible sources of errors needs to be mentioned. The first issue to be pointed out is the obtained data sources. The Thomson DataStream database, as previously stated, is the world’s largest historical financial database. It is a reliable source of information.

Microsoft Excel and SPSS is the software used to obtain results from equation (2) and (4). The results are presented in the result’s chapter. These programs are used for statistical and mathematical purposes, they are both well known, and are accepted for academic research. There exists no need to doubt their reliability or precision for a study at this level. The statistical t-test employed to verify the results is also standard procedure employed in most related research articles.

To make it possible to verify the findings, all data that is used in this study is gathered on a CD attached on the last page of the thesis.

4.6.2 Replication

By providing all the research processes, explanation and clarification along the study with the formulas descriptions, the theories explanations, the data collection, the methodologies explanation, and analysis and discussions, this research thesis can be replicated and redone in any market for any period.
4.6.3 Validity

For validity, by employing the data analysis methodology followed by the supporting literature review via the formulas described in chapter 4 a link improved among the formulas and the theories explained in the chapter 5 which provides the investigation and measurement of the results based on these theories.

The validity of this thesis methodology is considered high because the same procedures and fundamentals are being employed in this thesis work, as those that have been employed by renowned writers in this field.

The results obtained from this study show that both market (TSX and SSE) have had a similar trend during the period of examination, which gives another supports for validity of this study.

The presentation of obtained mathematical results and statistical results, employing figures is informative for the readers when a trend requires a clear explanation. Applying several figures in the illustration of the obtained results might be difficult to understand for the reader of the work. Therefore, the results are demonstrated in tables as well as figures.
5. Results

Having illustrated the methodology, the results obtained for the winners’ and losers’ portfolios of fifty stocks each is demonstrated in this chapter, whose formation date is built from the end of January when 12-month time-horizons are considered. Next, the statistical t-test of the obtained results for the markets (TSX and SSE) is demonstrated over the period 2000-2006. Later in this chapter discussions, regarding the findings of the study are presented, as well.

5.1 Empirical findings of TSX

CARs achieved with the performance of portfolios formed with fifty stocks with the highest cumulative returns (CR) during the previous 12 months. For the winners (losers) portfolio formed with the fifty stocks that have gained the highest (lowest) returns during formation periods of 12 months. Following, is calculating the CAR during the test periods (3, 6, 9 months) after the formation period. Table 4 presents the mathematical result of the momentum strategy for TSX for the period 2000-2007.

<table>
<thead>
<tr>
<th>Year</th>
<th>3-Month Holding Period</th>
<th>6-Month Holding Period</th>
<th>9-Month Holding Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Winners</td>
<td>Losers</td>
<td>W-L</td>
</tr>
<tr>
<td>2000</td>
<td>0.217</td>
<td>0.062</td>
<td>0.155</td>
</tr>
<tr>
<td>2001</td>
<td>0.248</td>
<td>0.377</td>
<td>-0.130</td>
</tr>
<tr>
<td>2002</td>
<td>-0.119</td>
<td>0.068</td>
<td>-0.188</td>
</tr>
<tr>
<td>2003</td>
<td>0.029</td>
<td>-0.013</td>
<td>0.042</td>
</tr>
<tr>
<td>2004</td>
<td>0.036</td>
<td>-0.123</td>
<td>0.159</td>
</tr>
<tr>
<td>2005</td>
<td>0.273</td>
<td>0.133</td>
<td>0.140</td>
</tr>
<tr>
<td>2006</td>
<td>0.110</td>
<td>-0.024</td>
<td>0.134</td>
</tr>
<tr>
<td>Average</td>
<td>0.113</td>
<td>0.069</td>
<td><strong>0.045</strong></td>
</tr>
</tbody>
</table>
The column of W-L displays positive average abnormal return individually for all the holding periods (3, 6, 9 months), whereas still we can not have any judgement about the profitability of the strategy in the market. In order to determine if these results are an indication of the existence of the momentum strategy or merely an occurrence of a chance, it is necessary to prove the profitability by a statistical t-test, which is presented later in this chapter.

5.2 Empirical findings of SSE

The same procedure of TSX is considered for SSE, as well. The winners (losers) portfolio are formed with the fifty stocks that have generated the highest (lowest) returns during formation periods of 12 months, followed by calculation for the CAR during the test periods (3, 6, 9 months). Table 5 displays the mathematical result of the strategy for the period 2000-2006.

<table>
<thead>
<tr>
<th>Year</th>
<th>3-Month Holding Period</th>
<th>6-Month Holding Period</th>
<th>9-Month Holding Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Winners</td>
<td>Losers</td>
<td>W-L</td>
</tr>
<tr>
<td>2000</td>
<td>0.061</td>
<td>0.074</td>
<td>-0.013</td>
</tr>
<tr>
<td>2001</td>
<td>0.152</td>
<td>-0.001</td>
<td>0.153</td>
</tr>
<tr>
<td>2002</td>
<td>-0.008</td>
<td>-0.093</td>
<td>0.085</td>
</tr>
<tr>
<td>2003</td>
<td>0.080</td>
<td>0.116</td>
<td>-0.036</td>
</tr>
<tr>
<td>2004</td>
<td>0.104</td>
<td>0.112</td>
<td>-0.009</td>
</tr>
<tr>
<td>2005</td>
<td>0.058</td>
<td>-0.002</td>
<td>0.060</td>
</tr>
<tr>
<td>2006</td>
<td>0.148</td>
<td>0.017</td>
<td>0.131</td>
</tr>
<tr>
<td>Average</td>
<td>0.085</td>
<td>0.032</td>
<td><strong>0.053</strong></td>
</tr>
</tbody>
</table>

Although the figures show that, the average CAR for all the W-L columns are positive, have a judgment about the profitability of the strategy in the market requires a statistical t-test. A statistical t-test is presented later in the chapter.
5.3 Testing the results for TSX

The statistical t-test applied for testing the results. The test measures the level of reliability of the obtained results in a study, which is called the significance level of the results. In order to conduct a t-test, the CAR of all the holding periods is placed in a SPSS spreadsheet with a 95% confidence interval. Although the mean of the holding periods are positive but the results does not show significance. The results are far from the significant level (table 6). There is no opportunity for arbitragers to gain arbitrary profits by long positions in past best performing stocks and short positions in past worst performing stocks.

In the table below the statistical results obtained from the strategy are presented. Although the upper difference of the intervals are positive and the means of the CARs also are positive, but the momentum strategy yields insignificantly returns. The abnormal returns of the strategy have a high volatility around the mean, for all the holding periods.

Table 6: T-test for TSX results (Test Value = 0)

<table>
<thead>
<tr>
<th>Holding Period</th>
<th>df</th>
<th>Mean</th>
<th>Sig. (2-tailed)</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Month</td>
<td>6</td>
<td>0.0446</td>
<td>0.449</td>
<td>0.14547</td>
<td>0.05498</td>
<td>-0.0900</td>
<td>0.1791</td>
</tr>
<tr>
<td>6-Month</td>
<td>6</td>
<td>0.0139</td>
<td>0.874</td>
<td>0.22147</td>
<td>0.08371</td>
<td>-0.1910</td>
<td>0.2187</td>
</tr>
<tr>
<td>9-Month</td>
<td>6</td>
<td>0.0239</td>
<td>0.888</td>
<td>0.42912</td>
<td>0.16219</td>
<td>-0.3730</td>
<td>0.4207</td>
</tr>
</tbody>
</table>

5.4 Testing the results of SSE

The same prior procedure is conducted for SSE in order to verify the reliability of results in a significance level. It is observed that none of the results in the table 7 is significance, although the upper difference of the interval is positive for all the holding periods. There is a high volatility of the strategy around the mean, which is far from the level of significance.
Table 7: T-test for SSE result (Test Value = 0)

<table>
<thead>
<tr>
<th>Holding Period</th>
<th>df</th>
<th>Mean</th>
<th>Sig. (2-tailed)</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Month</td>
<td>6</td>
<td>0.0530</td>
<td>0.109</td>
<td>0.07447</td>
<td>0.02815</td>
<td>-0.0159</td>
<td>0.1219</td>
</tr>
<tr>
<td>6-Month</td>
<td>6</td>
<td>0.1121</td>
<td>0.222</td>
<td>0.21772</td>
<td>0.08229</td>
<td>-0.0892</td>
<td>0.3135</td>
</tr>
<tr>
<td>9-Month</td>
<td>6</td>
<td>0.0924</td>
<td>0.451</td>
<td>0.30367</td>
<td>0.11477</td>
<td>-0.1884</td>
<td>0.3733</td>
</tr>
</tbody>
</table>

5.5 Further test for the TSX results

Although the statistical result for the period 2000-2006 shows that, the strategy does not perform significantly in both of the markets. In this part, another examination for the obtained results is conducted by excluding the year 2002 from the obtained data. The year 2002 has the lowest negative CAR among the other observations in the period in both of the markets (TSX and SSE); this occurrence is observable in table 4 and figure 3 of the text.

Figure 3: The trend of the momentum strategy for TSX
<table>
<thead>
<tr>
<th>Holding Period</th>
<th>df</th>
<th>Mean</th>
<th>Sig. (2-tailed)</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Month</td>
<td>5</td>
<td>0.0833</td>
<td>0.131</td>
<td>0.11298</td>
<td>0.04612</td>
<td>-0.0352</td>
<td>0.2019</td>
</tr>
<tr>
<td>6-Month</td>
<td>5</td>
<td>0.0847</td>
<td>0.170</td>
<td>0.12939</td>
<td>0.05282</td>
<td>-0.0511</td>
<td>0.2205</td>
</tr>
<tr>
<td>9-Month</td>
<td>5</td>
<td>0.1758</td>
<td>0.048</td>
<td>0.16552</td>
<td>0.06757</td>
<td>0.0021</td>
<td>0.3495</td>
</tr>
</tbody>
</table>

The results from the latter t-test show significantly different from the former one. The standard deviation around the mean has decreased in compare to the prior t-test (compare table 6 and 8). The mean of the CARs for all the holding periods have increased remarkably; the mean of the 3-month holding period increases by 2 times, the 6-month holding period increases by 6 times, and the 9-month holding period increases by approximately 7 times. Table 8 displays that the 9-month holding period of the momentum strategy shows statistical significance at the 5% level (Sig.2-tailed 0.048) with the average cumulative abnormal return (ACAR) of 17.58%, whereas the results for the 3 and 6-month holding periods are still insignificant.

### 5.6 Further test for the SSE results

Like as the TSX obtained result, the SSE has experienced the lowest negative CAR for the year 2002, it is observable from the table 5 and figures 4. The same procedure as TSX is conducted for SSE, Excluding the year 2002 from data and applying the statistical t-test once again.
The t-test table displays that neither the standard deviation of the 3-month holding period has decreased, nor the mean of that has increased. While the volatility around the mean for the 6 and 9-month holding periods have decreased and the mean of the strategy have increased by 1.5 times for the 6-month holding period and around 2 times for the 9-month holding period, as well. In addition, the results show statistically significant at the 10% level for the 6 and 9-month holding periods (Sig.2tailed 0.060, and 0.062).
5.6 Momentum and market movements (Discussion regarding the findings)

After running the statistical t-test twice with the different outcomes, the aim in this part is to analysing the different outcomes observed prior in the chapter and examining the effect of the bull and bear market on the profitability of the momentum strategy. As mentioned earlier, the result of the strategy for TSX during the period 2000-2006 shows insignificance. When the data for the year 2002 is excluded, the result of the t-test presents differently, the volatility of the data around the mean is reduced with a significant rate, and the result for the 9-month holding period displays significance at the 5% level (Sig, 2-tailed 0.048). The first t-test conducted for the SSE shows insignificance for all the holding periods, but after excluding the year 2002 the outcome changes to the significance level for the 6 and 9-month holding periods (Sig 2-tailed 0.060, and 0.062). The result shows substantial difference in compare to the earlier t-test (Sig 2-tailed 0.222, and 0.451).

In order to examine the cause of the different outcomes, an assessment of the performance of the markets during the period 2000-2006 is conducted. The following process is employed concerning a valid measurement of the market performance. Using the monthly closing prices for both of the markets’ indexes (S&P/TSX Composite Index and Affärsvärldens General Index (AFGX)) the monthly return of each index during the period is calculated. Next, the 12 months (yearly basis) CR for each of the indexes is calculated. The results are presented in the figures 5 and 6. Apparently, both of the markets experience the lowest CR in the year 2002 during the whole performance period of 2000-2006, same as the empirical finding of the momentum strategy for the both markets, which is abnormally negative CAR for all the testing periods for this year among others. As it obviously displays in the figures 5 and 6, for the period 2000-2002 markets experience the bear trend. However, the trends of the markets sharply change to the bull situation in year 2003. The CRs of both markets are higher than 10% during the period 2003-2006.
Figure 5: 12 months CR of the TSX market

Figure 6: 12 months CR of the SSE market

The sample period is divided into two states for both markets (TSX and SSE), one from the year 2000 to 2002 and the other sector uses data from 2003-2006. The markets have a negative 12-month average cumulative return (ACR) (-4.98% for TSX and -22.04% for SSE) during the period 2000-2002, which is considered a bear trend for the markets (tables 10,12). While, during the period 2003-2006 the markets have a positive 12-month ACR (18.3% for TSX and 26.08% for SSE) which is considered a bull trend for the markets (tables 10,12).
Table 10: The effect of the bull and bear market on the strategy for the years 2000-2006 (TSX)

<table>
<thead>
<tr>
<th>Holding Period</th>
<th>Market CR(^2)</th>
<th>3-Month</th>
<th>6-Month</th>
<th>9-Month</th>
<th>ACAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0.0832</td>
<td>0.0446</td>
<td>0.0139</td>
<td>0.0240</td>
<td>0.0275</td>
</tr>
<tr>
<td>Bull Trend</td>
<td>0.1830</td>
<td>0.1186</td>
<td>0.1307</td>
<td>0.2208</td>
<td>0.1567</td>
</tr>
<tr>
<td>(2003-2006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.002</td>
</tr>
<tr>
<td>Bear Trend</td>
<td>-0.0498</td>
<td>-0.0540</td>
<td>-0.1418</td>
<td>-0.2383</td>
<td>-0.1447</td>
</tr>
<tr>
<td>(2000-2002)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.223</td>
</tr>
</tbody>
</table>

Statistical t-test in parentheses

For TSX, the average cumulative abnormal return (ACAR) for each holding periods (3, 6, 9 months) is calculated. As obviously shown, the ACAR for all the holding periods during the bull period is positive (11.86%, 13.07%, 22.08%) while during the bear period is negative (-5.4%, -14.18%, -23.83%). Due to the lack of sufficient observations for each one of the holding periods, running the statistical t-test seems impossible. In order to solve the problem the CAR of all the holding periods (3, 6, and 9 months) are placed together (observable in the last column of tables 10 and table 11). The result shows that the ACAR of the momentum strategy during the bull trend is strongly significance at the 5% level (Sig 0.002) with the ACAR of 15.67%, while the result for the bear trend displays insignificant.

Table 11: T-test for bull and bear trend of the market TSX

<table>
<thead>
<tr>
<th>Market Trend</th>
<th>df</th>
<th>Mean</th>
<th>Sig. (2-tailed)</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull Trend</td>
<td>12</td>
<td>0.1567</td>
<td>0.002</td>
<td>0.13411</td>
<td>0.03871</td>
<td>0.0715</td>
<td>0.2419</td>
</tr>
<tr>
<td>Bear Trend</td>
<td>9</td>
<td>-0.1447</td>
<td>0.223</td>
<td>0.32862</td>
<td>0.10954</td>
<td>-0.3973</td>
<td>0.1079</td>
</tr>
</tbody>
</table>

\(^2\)Market CAR equals zero.
Table 12: The effect of the bull and bear market on the strategy for the years 2000-2006 (SSE)

<table>
<thead>
<tr>
<th>Holding Period</th>
<th>Market CR</th>
<th>3-Month</th>
<th>6-Month</th>
<th>9-Month</th>
<th>ACAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0.0546</td>
<td>0.0530</td>
<td>0.1122</td>
<td>0.0925</td>
<td>0.0859</td>
</tr>
<tr>
<td>Bear Trend</td>
<td>-0.2204</td>
<td>0.0750</td>
<td>0.0747</td>
<td>0.0156</td>
<td>0.0551</td>
</tr>
<tr>
<td>(2000-2002)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bull Trend</td>
<td>0.2608</td>
<td>0.0365</td>
<td>0.1403</td>
<td>0.1502</td>
<td>0.1090</td>
</tr>
<tr>
<td>(2003-2006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statistical t-test in parentheses

The same procedure of analyzing is conducted for SSE, as well. The result shows that the ACAR for the 3-month holding period is higher during the bear trend compare to the bull (table 12). However the ACAR shows higher rates for the other two holdings periods during the bull trend rather that the bear. After putting all the holding periods strategy together and running the statistical t-test, the results shows significance at the 5% level (Sig 0.005) for ACAR during bull trend with the 10.9% ACAR. But the ACAR is insignificant (Sig 0.602) during the bear trend for the SSE market.

Table 13: T-test for bull and bear trend of the market (SSE)

<table>
<thead>
<tr>
<th>Market Trend</th>
<th>df</th>
<th>Mean</th>
<th>Sig. (2-tailed)</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull Trend</td>
<td>12</td>
<td>0.1090</td>
<td>0.005</td>
<td>0.10837</td>
<td>0.03128</td>
<td>0.0401</td>
<td>0.1778</td>
</tr>
<tr>
<td>Bear Trend</td>
<td>9</td>
<td>0.0551</td>
<td>0.602</td>
<td>0.30418</td>
<td>0.10139</td>
<td>-0.1787</td>
<td>0.2889</td>
</tr>
</tbody>
</table>
6. Conclusion

This chapter presents the conclusions that can be derived from this quantitative work. I answer the research questions and explain the contribution of the research, finally mentioning some possible further researches within the field of the paper.

6.1 Conclusion of the study

Existing financial studies and literature over the last two decades has dominated with anomalies, which motivates the author to question not only the momentum strategy and market efficiency, but also further more examining of the performance of the strategy during bull and bear trend. One of the researches’ topics that have attracted great attention of the researchers and readers is in the possibility that the market’s investors might be able to acquire the abnormal returns with the prediction of the future returns on specific stocks.

The momentum strategy is the formula situated on such predictions that has especially motivated the author in choosing the topic of the thesis and more over the research questions. The momentum strategy, based on the under-reaction hypothesis, recommends buying the winners stocks and selling the losers’ stocks.

This study has examined the possible existence of such a strategy in TSX and SSE. To examine the existence of the strategy, the 12 months formation period, with the three different time horizons as a testing periods (3, 6, and 9 months) after the formation period, as well as two different calculation methods (arithmetical and buy-and-hold) for the returns after downloading the monthly closing prices, have been conducted.

Before concluding, the research questions are re-stated:
1. Can traders earn abnormal profits by applying the momentum investment strategy? (An examination of TSX and SSE)
2. Are momentum profits stronger during bull or bear market? (An examination of TSX and SSE)
The outcome of the study displays important indicators and hints for a better understanding of the momentum investment strategy in the markets, for the author and the readers of the work. On one hand although the expected pattern in the returns for the 3, 6, 9-month time-horizons of holding the portfolios for both markets is observed the positive momentum abnormal returns, the CAR for all the holding periods are not statistically significant. There is a high volatility of observations around the mean. On the other hand, one can find that the 9-month holding period for TSX is significant at 5% level after excluding the year 2002, due to the highly negative CAR for the year 2002, which deviates from the sample, but the results for 3 and 6-month holding periods are still insignificance for the market. While the t-test result for SSE is significance for 6 and 9-month holding periods at 10% level.

The strategy is dependent on the length of the holding period of the portfolios. There is no significance result for the 3-month holding period in both markets. But the results for 6 and 9-month holding periods show significance. The profitability of the strategy is dependent on the length of the holding period.

In addition, the paper investigates whether the state of the market (bull and bear) has an impact on the returns of the momentum strategy. The results show that the direction of the market has an important rule in determining momentum profits. The ACAR of the strategy appears stronger (higher and significant) during bull market. After dividing the sample period in two different states (bull and bear), the result shows that the momentum strategy for TSX is neither positive nor significant during the bear market (2000-2002). The strategy for SSE during the same period shows positive but not significant. On the other hand, the study proves the momentum strategy yields significant positive abnormal returns during the bull market (2003-2006) for both TSX and SSE markets. Due to the obtained result both of the markets are not efficient, momentum anomaly exists and performs profitable during bull trend, thus arbitrators can gain the momentum profit (abnormal profits) by adopting the strategy in the bull trend of the markets.

According to the Fama’s theory (EMH) as mentioned earlier in chapter 3, a market holds efficient level when one cannot gain abnormal return by applying a certain strategy in the market. But the results display that the momentum strategy is statistically profitable in both markets (TSX and SSE), which indicate of the inefficiency of the markets. In addition, the results support the findings of Jegadeesh and Titman (1993) in the US market, the study of
Forner and Marhuenda (2003) for the Spanish market, and the results of Schmitz et al. (1994/1995) for the Canadian market, which displayed even stronger evidence of momentum strategy in stock returns.

6.2 Practical and theoretical contributions

The practical contribution of this thesis:

The conclusions obtained in this work have important implications, not only for the Canadian and Swedish stock markets, but also for stock markets in general. The study goes fine for the investors who lack confidence and hesitate about making their decision. If they choose their momentum portfolios strategy during the bull trend of market, their abnormal return is assured on in a significant level. Moreover, the results are economically and statistically meaningful, that is considerable to be of interest to investment companies and portfolio managers.

The theoretical contribution of this thesis:

Searching for the articles related to the topic shows that no earlier studies on momentum strategy have been conducted on the SSE market, while several studies have been written on the U.S and Canadian market in the field.

Generally, the paper shows that the momentum strategy in TSX and SSE is positively significantly depended and related to the markets trend. No earlier researches have been investigated the profitability of the strategy during bull and bear market.

Another aspect that the work addresses is regarding to market efficiency (Fama 1970) and the existence of the anomalies in market. The discussions regarding the three different levels of the Fama’s theory and anomalies in market have seen much criticism over the last decades.

The empirical contribution of this thesis work is also considerable. The methodology employed for this work can be applicable for future researchers that are interested in the
phenomenon of momentum strategy for other periods, other markets, or some other related subjects. The results of the study from monthly closing price to the statistical t-test results, the full body of the data employed probably can be useful as a starting point for the researches who long to investigate the research field in question any further.

6.3 Suggestions for further research

While addressing this study on the TSX and SSE markets, some interesting future research topics within the field of the study have come to the author’s mind.

One suggestion for a future research topic is the examining of the performance of the strategy in different sectors of the industries in which stocks operate. Therefore, it would be interesting to see whether it is possible to make abnormal profits employing momentum investment strategy by speculating on stocks in a particular industry.

Another suggestion it can be an investigation of the performance of the momentum strategy on other financial instruments like as options and warrants. Although the risk associated with options and warrants is larger than the risk associated with stocks but the risk increases the rate of return on the financial instruments as well, which explains the possible abnormal return.

Due to the limited time, this study investigates the existence of the momentum strategy in the markets and examines the effect of the bull and bear trend on the profitability of the strategy. As a future study, it will be interesting to consider and examine the factor of risk and transaction costs on the profitability of the strategy. However, the obtained results of the study are strong enough to cover the factor of risk and transaction costs.

The study is limited to TSX and SSE, the same strategy could be investigated in other markets such as; Asian, European, African, and south of America. It would be of interest to see whether the strategy accesses to the same results for other countries during bull and bear market.
In addition, it will be interesting to examine the profitability of the momentum strategy during bull and bear trends of a market for a longer period of investigation, for instance the duration of 50 years.
7. References

7.1 References:


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### 7.2 Further study


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3 A list of the references that are not cited in the text but which make an important contribution to the work (Matt Holland, 2004)


