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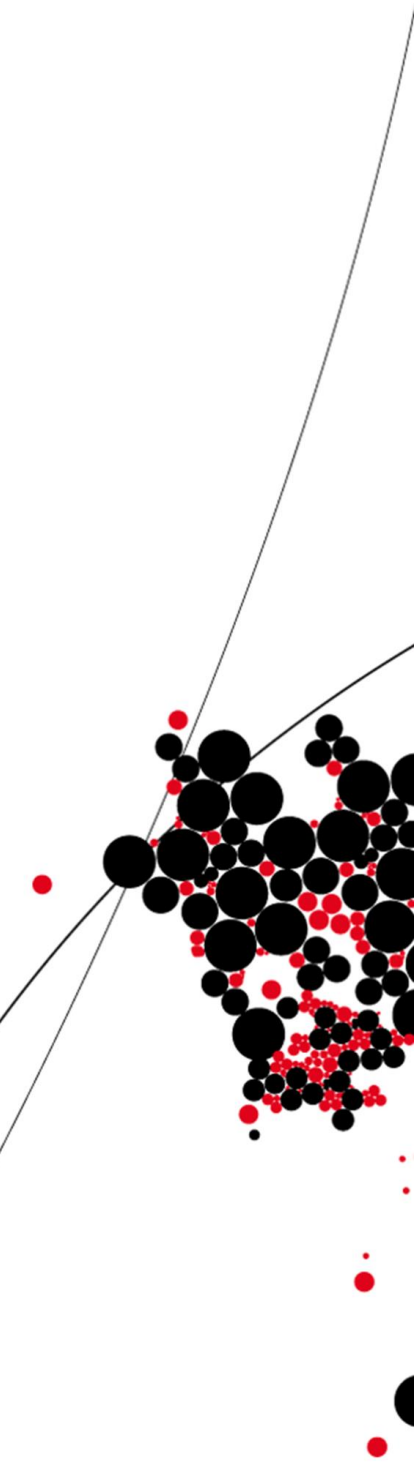

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Identifying and trading reversals following a downward overreaction:

The MOPOI trading algorithm

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Glossary

The Glossary provides definitions of the technical and conceptual terms that can be found in this paper. The definition to a term, as it is stated here, is the definition that has been used throughout the paper, unless stated otherwise.

Bollinger Bands: The Bollinger Bands are volatility bands placed above and under a moving average of an underlying security. The volatility bands are calculated of a number of standard deviations from the moving average, which causes the bands to widen as volatility increases, and to narrow when volatility decreases *(Investopedia, 2016, Bollinger Band)*.

CAC 40: The CAC 40 is the French stock market index, which represents the market-capitalization weighted and free-float adjusted index of the 40 largest equities listed on the Euronext Paris *(Investopedia, 2016, CAC40)*.

DAX 30: The DAX 30 is the German stock market index, which represents the market-capitalization weighted and free-float adjusted index of the 30 largest equities listed on the Frankfurt stock exchange *(Investopedia, 2016, Definition of DAX)*.

DJIA: The DOW 30, also known as the Dow Jones Industrial Average (DJIA), is a stock market index, which represents the market-capitalization and float-adjusted of 30 significant stocks listed on the New York Stock Exchange and the NASDAQ *(Investopedia, 2016, Dow Jones Industrial Average)*.

FTSE 100: The FTSE 100 is the Financial Times Stock Exchange 100 index. The FTSE 100 represents the market-capitalization and float-adjusted index of 100 companies listed on the London Stock Exchange with the highest market capitalization *(Investopedia, 2016, Footsi)*.

Geometric return: The compounded return over a particular period.

HSI:	The HSI, also known as the Hang Seng Index, is the market index of Hong Kong, which represents the 50 largest capitalization-weighted and float-adjusted equities listed on the Hong Kong Exchange *(Investopedia, 2016, Hang Seng Index - HSL)*.
Long position:	A position in which the holder of the position bought the (underlying) security, and will profit if the price of the (underlying) security goes up.
Oscillator:	A technical analysis tool that plots two extreme values in order to create a band with which an assessment can be made of moments in which the underlying security might be overbought or oversold *(Investopedia, 2016, Oscillator)*.
S&P500:	The S&P500 is an American stock market index, which represents the capitalization-weighted index of 500 large companies that have a listing on the New York Stock Exchange or the NASDAQ *(Investopedia, 2016, What does the S&P500 measure and how is it calculated?)*.
Trailing-stop:	A trailing stop is a stop loss that is set at a fixed percentage point difference below the underlying security (in the case of a long position). When the underlying security goes up, the trailing stop goes up by the same percentage, but when the market goes down the trailing stop remains at the highest level it has reached.
VIX:	The VIX is the Volatility Index that is calculated by the Chicago Board Options Exchange. The VIX is a trademarked measurement tool of the market's expectation of the S&P500's volatility over the next 30-day period *(Investopedia, 2016, VIX – CBOE Volatility Index)*.
WVF / Williams VIX fix:	The Williams VIX fix (WVF) is a synthetic VIX created by Larry Williams. The Williams VIX fix is a tool which output closely resembles the VIX, but is easier to compute *(Williams, 2007)*.

WVF value: A WVF value is a value generated through the Williams VIX fix. A WVF value is an expression of the downward volatility of the underlying security. A WVF value is the percentage point difference between the low of the day, for which the WVF is calculated, compared to the highest level over the last 22 trading days.

Executive summary

The aim of this paper is to develop a trading algorithm that shows potential to disprove the weak form efficiency of the efficient market hypothesis. Such a trading algorithm provides researchers a new tool with which the weak form efficiency can be tested in future research. The trading algorithm that has been developed in this research has been based on the overreaction hypothesis (OH), as formulated by De Bond & Thaler in 1985. The overreaction hypothesis comprises of two sub-hypothesis:

OH-I: "Extreme movements in stock prices will be followed by subsequent price movements in the opposite direction" *(De Bond & Thaler, 1985, p. 795)*

OH-II: "The more extreme the initial price movement, the greater will be the subsequent adjustment" *(De Bond & Thaler, 1985, p. 795)*

Based on the overreaction hypothesis, a reversal is expected subsequent to an overreaction. The trading algorithm that has been developed in this paper has been designed to identify overreactions on the underlying assets on which the trading algorithm is employed, and to enter a long position at the end of the identified overreaction, as at this point a reversal is expected to occur on the underlying asset. The trading algorithm that has been developed in this paper has been named the Martin Odink Pessimism Overreaction Identifier trading algorithm, or for short the MOPOI trading algorithm.

In short, the MOPOI trading algorithm calculates and assigns a volatility level of downward volatility on the underlying asset to each trading day, based off of a look back period of 22 trading days. From these volatility levels a moving average is calculated, and a standard deviation is plotted from the moving average. Whenever the volatility level of a given trading day exceeds the corresponding level generated by the standard deviation off of the moving average of a series of volatility levels then overreaction is assumed on the underlying asset on that given trading day. This overreaction is assumed to end once the volatility levels no longer exceeds the level generated by the standard deviation off of the moving average.

In order to work out the MOPOI trading algorithm, unidentified parameters had to be identified. These parameters included the number of days off of which the moving average is calculated, and the number of standard deviations with which the threshold level is being plotted over the moving average. Aside from these two parameters, more tests were performed as the MOPOI trading algorithm signalled overreactions, and the end of overreactions, at times that were counterintuitive or questionable. These counterintuitive and questionable signals are signalled in the following situations:

- In times of long continuous upward movement of the underlying asset, a downward movement of a few tens of a percentage point could cause the MOPOI trading algorithm to signal an overreaction on the underlying market. This may occur as the moving average and the plotted threshold level over the moving average would have reached levels close to zero. A downward movement of tens

of a percentage point in a strong upward market, intuitively, is not associated with a downward overreaction on the underlying asset. In order to account for this occurrence, a range of threshold levels have been tested. The threshold level represents a percentage point threshold that the underlying asset needs to decline before a trigger of the MOPOI trading algorithm associated with an overreaction on the underlying asset.

- A questionable signal is provided by the MOPOI trading algorithm at times when an asset trades flat, or substantially decreases its steepness of downward movement, subsequent to a decline on the underlying asset, which is being associated with an overreaction on the underlying asset. In such moments, at times, the volatility levels retrace within the levels of the threshold level that has been plotted over the moving average. Therewith, an end is signalled to the overreaction, while no reversal is occurring. To account for these situations, two conditions have been tested that demand a confirmation of a reversal through demanding lower closes of previous trading days.
- At times the algorithm signals to enter a long position at times when another long position is still open. The question, however, is whether multiple open long positions should be allowed, as these long positions are based on the same overreaction. A restriction to the number of simultaneously opened long positions have been tested in this paper, in order to investigate whether this is beneficial to the returns generated by the algorithm

After testing the aforementioned conditions to the counterintuitive or questionable situations, on the S&P500 over the period 01/01/1991 to 31/12/2015, the following results were found: A threshold level of 0.0%-0.7% yielded the highest summated return, and therewith imposing a threshold level does not improve the return found for the MOPOI trading algorithm. Imposing a condition that demands that the close of the first trading day, at which the overreaction is no longer assumed, to be higher than the prior trading day, improved the return found for the MOPOI trading algorithm. A longer look back period resulted in a lower summated return. Imposing a restriction to the number of simultaneously opened long positions to one, lowers the summated return found for the MOPOI trading algorithm.

Once all of the aforementioned parameters were known, a geometric return of 97 buy and sell strategies have been calculated to determine which buy and sell strategy returns the highest geometric return for the MOPOI trading algorithm. This has been done by calculating the geometric returns for a range of 97 buy and sell strategies for the period 01/01/1991 to 31/12/2015 on the S&P500. The highest geometric yielding buy and sell strategy has been adopted. Thereafter, the MOPOI trading strategy with the identified parameters, conditions, and buy and sell strategy has been employed on the CAC 40, DAX 30, DJIA, FTSE 100, the Hang Seng Index, and the S&P 500 to calculate the geometric return of the MOPOI trading algorithm on these equity markets for the period 01/01/1991 to 31/12/2015. After adjusting the MOPOI trading strategy for two-way transaction costs of 37.5 base points, the geometric returns found

for the MOPOI trading strategy compared to the underlying equity markets were as follows:

	Geometric return underlying equity market	Geometric return MOPOI trading algorithm	MOPOI trading algorithm / equity market -100%
CAC 40:	203.71%	580.98%	185.20%
DAX 30:	675.67%	1,527.43%	126.06%
DJIA:	567.53%	136.19%	-76.00%
FTSE 100:	187.97%	361.28%	92.20%
Hang Seng Index:	615.20%	1,431.01%	132.61%
S&P 500:	516.68%	595.01%	15.16%

Table 1: Overview geometric returns

The MOPOI algorithm is able to outperform all tested equity markets, with the exception of the DJIA. A possible explanation as to why the MOPOI trading algorithm is not capable of outperforming the DJIA may be found in the difference of the volatility between the DJIA and the S&P500. The buy and sell strategy of the MOPOI trading strategy has been selected based on the S&P500 and may, due to the difference in volatility, not be compatible with the DJIA. The MOPOI trading algorithm does shows potential to be a trading algorithm that is capable of systematically outperforming financial markets that are ought to be weak form efficient by literature.

Due to limited time and resources, this paper does not cover all possible ranges and combinations for the parameters, conditions and buy and sell strategies. A higher geometric yielding MOPOI trading algorithm can likely be formulated, by testing a wider range of parameters, conditions and buy and sell strategies.

In order to test the weak form efficiency the MOPOI a beta for a portfolio that trades solely on the input generated by the MOPOI trading algorithm must be calculated, as the weak form efficiency theory states that the markets cannot be outperformed on a risk adjusted basis *(Fama, 1970)*. Furthermore, the tested equity markets will have to be adjusted for dividends, when applicable.

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1. Introduction

Technical analysis is a methodology for forecasting price movements based on historical price data *(Beltman, Sault, & Schultz, 2009)*. According to the efficient market hypothesis, market participants cannot consistently outperform the market on a risk-adjusted basis *(Fama, 1970)*. The weak form efficiency of the efficient market hypothesis describes a market in which all historical information is efficiently digested. Therefore, historical price data cannot be used to make future price movements predictions, which results in higher returns than the buy and hold strategy on a risk-adjusted bases *(Burton, 2003; Fama, 1970)*.

Technical analysis is widely used, despite the claim that technical analysis holds no predictive value. A study by Menkhoff *(2010)* revealed that from a sample of 692 fund managers, from across five countries, 87% of the respondents placed at least some degree of importance on technical analysis in their decision making process. For a forecasting horizon of weeks, technical analysis is the most important form of analysis for fund managers, outperforming fundamental analysis in terms of importance (Menkhoff, 2010). Among foreign exchange dealers more than 95% of the professionals placed at least some importance on technical analysis (Gehrig & Menkhoff, 2006).

Widespread importance of technical analysis among professionals does not per se disprove the weak form of the efficient market hypothesis. Without evidence that professionals are capable of systematically outperforming the market, which is attributed to the use of technical analysis, the weak form efficiency is not rejected by the argument that the technical analysis is widely used among professionals.

With the claim made by the weak form efficiency that technical analysis holds no predictive value, and the fact that mutual funds are not capable of systematically outperforming the market *(Pastor & Stambaugh, 2002)*, the question arises why technical analysis is widely used. Is the claim made by the weak form efficiency false, or are many investors relying on a tool, in forecasting a securities price movement, which holds no predictive value?

The question whether the weak form efficiency holds, is a question that many researchers investigated. The result whether the weak form efficiency holds shows mixed results across countries. The weak form efficiency appears to hold for the financial markets of the majority of the developed countries such as: Australia *(Ellis & Parbery, 2005; Loh, 2004; Park; Heaton, 2014)* Canada *(Alexeev & Tapon, 2011)* England *(Righi & Ceretta, 2013)* France *(Righi & Ceretta, 2013),* Germany *(Righi & Ceretta, 2013),* and the United States of America *(Ellis & Parbery, 2005)*. The exception to this list is Israel, for which evidence has been found that is not congruent with the weak form efficiency *(Lim, 2009)*. The majority of studies conducted among newly developed industries & emerging markets found result that were in conflict with the weak form efficiency, such as for: Colombia *(Duarte-Duarte, et al, 2014)* Egypt *(Lim, 2009)*, Ghana *(Ntim, Opong, & Danbolt , 2007),* Jordan *(Lim, 2009),* Morocco *(Lim, 2009)* and South Africa *(Lim, 2009)*.

In the field of behavioural finance, there is a hypothesis named the "stock market overreaction hypothesis". The stock market overreaction hypothesis states that investors are subjected to waves of optimism and pessimism, through which a momentum can be created which causes the price of the underlying asset to temporarily shift from its fundamental value *(De Bond & Thaler, 1985; De Bond & Thaler, 1987)*. Herewith, the overreaction hypothesis is in direct conflict with the efficient market hypothesis. One of the hypotheses of the overreaction hypothesis that receives support in literature is the directional effect. The directional effect states that: "Extreme movements in stock prices will be followed by subsequent price movements in the opposite direction" *(De Bond & Thaler, 1985, p. 795)* Trading strategies to exploit any given momentum have not been proven to be able to outperform the buy and hold return due to transaction costs involved (*Fung, Lam, & Lam, 2010;* Lobe & Rieks, 2011; Odean, 1999; *Otchere & Chan, 2003)*.

This paper has been written to contribute to the on-going discussion regarding the predictive value of technical analysis. In this paper the overreaction hypothesis has been translated into the Martin Odink Pessimistic Overreaction Hypothesis (MOPOI) algorithm, which has been designed to identify moments of overreactions on equity markets, and to identify the moments in which a reversal follows after an overreaction. The MOPOI algorithm is thereafter transformed into the MOPOI trading algorithm by adding a buy and sell strategy to trade these reversals. The geometric return of the MOPOI algorithm for the period of 01/01/1991 to 31/12/2015 is compared to the geometric return of the CAC 40, DAX 30, DJIA, FTSE 100, Hang Seng Index and the S&P 500 for the same period, to see whether the MOPOI trading algorithm is capable of outperforming the market, and to see whether technical analysis can be employed to systematically make profits over a time horizon of multiple years. Multiple equity markets are included to account for data snooping bias.

Developing a new trading algorithm is more appropriate than testing well-known existing trading rules, as new prediction methods may yield gains that will cease to exist once the method becomes widely used. Once an algorithm becomes widely available the potential gains will be incorporated in the prices, and the algorithm will cease to be successful (Timmermann & Granger, 2004).

The MOPOI algorithm is an algorithm that aims to identify entry moments in which a reversal follows up after an overreaction. Several conditions have been formulated with the MOPOI algorithm in order to improve the efficiency of the MOPOI algorithm. The MOPOI algorithm and the conditions to the MOPOI algorithm can be found in chapter 3 of this paper. The main research question of this paper flows forth from the question whether the MOPOI trading algorithm yields a higher geometric return, after transaction costs, than the underlying equity. Parameters for the MOPOI algorithm, and conditions to the MOPOI algorithm, and a buy and sell strategy must be formulated and assigned to the MOPOI algorithm before a geometric return of the MOPOI trading algorithm can be calculated. These missing pieces lead to the following main research question, and sub questions.

1.1 Main research question:

"What is the historical[1] difference between the geometric return of the MOPOI trading algorithm compared to the geometric return of the selected equity markets[2]?"

In order to answer the main research question the following sub-questions have been formulated:

1. What are the most efficient parameters for the MOPOI algorithm?
2. What are the most efficient parameters for the proposed conditions to the MOPOI algorithm?
3. Which combination of conditions contributes most to the efficiency of the MOPOI algorithm?
4. What is the highest geometric return yielding buy and sell strategy for the MOPOI trading algorithm?
5. What are the historical[1] returns of the MOPOI trading algorithm for the selected equity markets[2]?
6. What are the historical[1] returns of the selected equity markets[2]?

[1] *Historical refers to:*	The time period of 01/01/1991 to 31/12/2015
[2] *Selected equity markets refers to:*	CAC 40, DAX 30, DJIA, FTSE 100, the Hang Seng Index and the S&P 500

1.2 Theoretical contribution

The efficient market hypothesis is addressed in a large number of studies. Despite the vast amount of research conducted in regard to the efficient market hypothesis, there is still no consensus among researchers whether the efficient market hypothesis holds (Sewell, 2012). This study aims to develop a potent trading algorithm, with which the weak form efficiency can be challenged in future research. Literature shows that the weak form efficiency generally holds for equity markets in developed countries *(Alexeev & Tapon, 2011; Ellis & Parbery, 2005; Loh, 2004; Park; Heaton, 2014; Righi & Ceretta, 2013)*. When the MOPOI algorithm shows potential to outperform several or all the equity markets tested in this paper, namely the CAC 40, DAX 30, DJIA, FTSE 100, the Hang Seng Index and the S&P 500, then future research can challenge the weak form efficiency by transferring the MOPOI trading algorithm into an instrument that can be compared with a the underlying equity market on a risk adjusted basis.

1.3 Practical contribution

When this study reveals that the MOPOI trading algorithm is capable of outperforming several major equity markets, then this may have an impact on the way in which private and professional investors trade on the financial markets. The MOPOI trading algorithm is unlikely to outperform the market when it is widely adopted, as with a widely available trading strategy the potential gains will be incorporated in the prices, making the trading strategy cease to be successful *(Timmermann & Granger, 2004).* However, when the MOPOI trading algorithm manages to outperform one or more of the tested equity markets, then the results found in this study imply that new trading strategies can be developed based on logical reasoning that are capable of outperforming the underlying equity market. Such knowledge, based on empirical evidence, may cause both private as professional investors to develop new trading tools and strategies, and may thus change the way in which institutions, such as pension funds, invest in the financial market.

2. Theoretical Framework

Within this theoretical framework two theories will be addressed. Chapter 2.1 addresses the efficient market hypothesis, whereby the main focus is placed on the weak form efficiency of the efficient market hypothesis. The weak form efficiency is being addressed to familiarize the reader, and to bring the reader up-to-date with recent findings regarding the weak form efficiency. It will also provide the reader with a sense whether the weak form efficiency is perceived to be holding, and for which markets the weak form efficiency is perceived to holding.

Chapter 2.2 elaborates on the overreaction hypothesis and the two main hypotheses as formulated within the overreaction hypothesis. The overreaction hypothesis is the underlying theory on which the MOPOI trading algorithm has been formulated. The overreaction hypothesis is included in this theoretical framework to familiarize the reader with the principles of the overreaction hypothesis and the two main hypotheses that have been formulated within the overreaction. Furthermore, the overreaction hypothesis is addressed to bring the reader up to date with recent publications in regard to the overreaction hypothesis.

2.1 Efficient Market Hypothesis

2.1.1 Origins Efficient Market Hypothesis

One of the earliest formulations of market efficiency can be found in the book entitled *The Stock Markets of London, Paris and New York,* written in 1889 by George Gibson. In his book, Gibson wrote, "when shares become publicly known in an open market, the value which they acquire may be regarded as the judgment of the best intelligence concerning them" *(p. 11).* In the years following 1889 more literature can be found in which an efficiency of the financial markets is suggested *(Sewell, 2011)*. The first empirical evidence of efficient markets emerged in the early 1960's *(Alexander, 1961; Cootner, 1962; Granger & Morgenstern, 1963; Samuelson, 1965; Steiger, 1964).* The efficient market hypothesis gained popularity after the paper by Eugene Fama in 1970 in which Fama performed a review of theory and empirical work. The paper by Fama *(1970)* is often seen as the corner stone of the efficient market hypothesis *(Sewell, 2012)*. Fama *(1970)* defined efficient markets as: *"A market in which prices always "fully reflect" available information is called "efficient""* (p. 383).

Fama *(1970)* formulated three hypotheses to the efficient market hypothesis, namely: the weak form, the semi-strong form, and the strong from of the efficient market hypothesis. The weak form implies that the market is efficient, reflecting all market information. The semi-strong form implies that the market is efficient, reflecting all publicly available information. The strong form implies that the market is efficient, and that all information, both private and publicly available, is incorporated in the market.

Subsequent to the paper of Fama, the efficient market hypothesis has been the central proposition of finance and is one of the most studied propositions in social science. *(Sewell, 2012)*. More than forty years after the paper of Fama *(1970)* there is still no consensus whether the efficient market theory holds *(Sewell, 2012)*. In the decade subsequent to the paper of Fama the efficient market hypothesis gained a lot of support *(Sewell, 2012)*. However, from the year 1980 onward, more cases against the efficient market hypothesis were published. The arguments against the efficient market were both based on logical reasoning as well as through empirical evidence against the efficient market hypothesis. Rossman and Stiglitz *(1980)* stated, based on logical reasoning, that the market cannot be perfectly efficient as otherwise there would be no incentive for professionals to spend resources on the acquisition of information. Another argument against the efficient market hypothesis is that the efficient market hypothesis fails to explain extreme market related events, such as market bubbles *(Brown, 2011)*.

2.1.2 Weak Form of the Efficient Market Hypothesis

The weak form of the efficient market hypothesis (hereafter referred to as the weak form efficiency) describes a market in which all historical information is efficiently digested and therefore historical price data cannot be used to make future price movements predictions, which systematically generates higher returns than the buy and hold strategy on a risk-adjusted bases *(Burton, 2003; Fama, 1970)*. According to the weak efficient form, technical analysis, which is a methodology for forecasting price movements based on historical price *data (Beltman, Sault, & Schultz, 2009)*, should thus not be able to systematically generate higher returns than the buy and hold strategy on a risk-adjusted basis. In a market with no transaction costs and in which all information is costlessly available to all market participants, the weak form efficiency is ought to hold *(Fama, 1970)*.

2.1.3 Prior testing weak form efficiency

The weak form of the efficient market hypothesis can be tested through a set of trading rules. The weak efficient form of the efficient market hypothesis would be disproved when a trading rule systematically generates returns, after transaction costs, which significantly outperform the market on a risk adjusted basis. Multiple papers have been published in which the weak efficient form has been tested. Hereafter an overview is provided of recent studies of the weak form efficient for countries that fall in the category of either: developed countries, newly industrialized countries, or countries that are regarded as emerging markets.

Developed countries: Righi & Caretta *(2013)* tested the weak form efficiency of the CAC 40, DAX 30 and the FTSE 100 in the period of the Eurozone financial crisis. All three equity markets were efficient throughout the Eurozone financial crisis after testing the weak efficient form through a variance ratio test (Righi & Ceretta, 2013).

Park & Heaton *(2014)* tested a set of 1,847 technical trading rules on the Australian financial markets. Their results were that they were not capable of finding significant evidence that technical trading rules are capable of generating excess returns over the buy and hold strategy in the Australian financial markets on a risk adjusted basis. The same conclusion has been found in other papers for the financial markets of Australian (Ellis & Parbery, 2005; Loh, 2004).

Marshal, et al. *(2008)* tested 7,846 popular technical trading rules on the U.S. equity markets. The result from their study is that none of the trading rules were profitable after accounting for data snooping bias. Other recent papers concluded that the weak efficient form of the efficient market theory holds for the United States of America (Ellis & Parbery, 2005) as well as for Canada (Alexeev & Tapon, 2011).

Newly industrialized countries: In a test for weak form efficiency on the stock market of South-Africa, Lim *(2009)* found evidence against the weak form efficiency. In his research Lim conducted a series of nonlinearity tests, after removing all short-term linear dependence.

Mobarak & Fiorante *(2014)* tested the weak form efficiency for the financial markets of Brazil, China, India and Russia in the period of September 1995 to March 2010. Through a variance ratio test they concluded that the financial markets of all four countries were not weak form efficient, but are becoming more efficient over time. Lim, Habibullah & Hinich *(2009)*, tested the weak form efficiency for Chinese stock markets over the period of 1995 to 2003. They drew the same conclusion as Mobarak and Fiorante *(2009)*, that the Chinese stock markets are not always efficient, but are becoming more efficient over time.

Emerging markets: The financial markets in Ghana have been tested based on parametric and non-parametric variance ratio tests. Based on these tests the weak form efficiency for the financial markets has been rejected, which can be explained due to the small size of the financial markets in Ghana (Ntim, Opong, & Danbolt , 2007).

Duarte-Duarte, et al. *(2014)* found that the weak form of the efficient market theory does not hold for the Colombian market. This conclusion was drawn after performing a BDS, Ljung-Box and Bartlett test for the Colombian market.

In a study conducted by Lim *(2009)*, the stock markets of Egypt, Jordan, and Morocco were tested for efficiency through a series of nonlinearity tests, after removing all short-term linear dependence. Based on the results found, the weak form efficiency did not hold on any of the three markets.

2.2 Overreaction Hypothesis

2.2.1 Origins Overreaction Hypothesis

In 1985 the market overreaction hypothesis came forth from the field of behavioural finance. The market overreaction hypothesis states that investors overreact due to excessive optimism or pessimism among investors, which causes the price of the underlying asset to temporarily shift from its fundamental value *(De Bond & Thaler, 1985; De Bond & Thaler, 1987).* The overreaction occurs due to investors overweighting on recent information *(Bernstein, 1985; De Bond & Thaler, 1987)*. Based on research from the field of experimental psychology, De Bond and Thaler *(1985)* formulated the following overreaction hypotheses (OH):

OH-I: "Extreme movements in stock prices will be followed by subsequent price movements in the opposite direction" *(p. 795)*. (Later labelled as the Directional effect *(Brown & Harlow, 1988)*).

OH-II: "The more extreme the initial price movement, the greater will be the subsequent adjustment" *(p. 795)*. (Later labelled as the Magnitude effect *(Brown & Harlow, 1988)*).

De Bond and Thaler *(1985)* tested the directional effect by reviewing the performance of "winning" and "losing" portfolios. The winning portfolios consists of US stocks that outperformed the US stock market over a three year period, whereas the losing portfolio consisted of US stocks that underperformed the US stock market in the same three year period. Subsequently to the formation of the portfolios a contrarian strategy was adopted, based on the view that stocks exhibit a mean reversal. Based on that view, selling winning portfolios and buying the losing portfolios should gain excess returns. De Bond and Thaler *(1985)* found statistical significant evidence for the directional effect in their study, where the losing stocks outperformed the winning stocks over a period of three years after formation. In their study, De Bond and Thaler *(1985)* did not find results that support the magnitude effect.

Subsequent to the paper of De Bond and Thaler *(1985)*, studies came forward that suggested that the findings of De Bond and Thaler *(1985)* could be explained through the change in ratio's and the CAPM beta that resulted from the decrease or increase in the stock price *(Chan, 1986; Chan, 1987; Vermaelen & Verstringe, 1986)*. De Bond and Thaler conducted a follow up study in 1987. In this study De Bond and Thaler refined their methodology in which they included market risk, firm size and seasonality *(De Bond & Thaler, 1987)*. In this follow up study De Bond and Thaler remained to find statistical significant evidence that supports the directional effect.

2.2.2 Development of the Overreaction Hypothesis

The overreaction hypothesis became a central proposition for multiple studies subsequent to the papers of De Bond and Thaler. The time frame in which the overreaction occurs, and the markets on which overreaction occurs, are two main aspects that has been subjected to research. In 1990, Jegadeesh performed a study to test whether the reversal of stock returns can be found for portfolios with a shorter formation period than a three-year formation period, as used by De Bond & Thaler in 1985. Jegadeesh *(1990)* found a statistically significant monthly abnormal return of 1.99%, by short-selling the previous month's winners and buying the previous month's losers throughout the period of 1934 to 1987. Thereafter, the overreaction has been tested on multiple time frames. The following contributions are recent contribution to the literature surrounding the overreaction hypothesis:

Lobe & Rieks (2011) found that overreaction occurs on the Frankfurt stock exchange on a 1-day basis. The abnormal returns that were found for the Frankfurt stock exchange did not become smaller over time and could not be explained by the lack of liquidity, or the bid-ask spread. They also found that reversals from losing portfolios are stronger than the reversals of the winning portfolios. The abnormal returns that were found cannot be exploited, as transaction costs prohibits the implementation of a profitable trading strategy *(Lobe & Rieks, 2011)*.

Overreaction has also been found on major Asian equity markets. The equity markets of Singapore, South Korea, Hong-Kong, Taiwan and Japan overreact on the overnight performance of the U.S. market *(Fung, Lam, & Lam, 2010)*. Despite that these Asian markets and their information flow are maturing, Fung, Lam & Lam concluded that overreaction on these markets does not disappear. No rational explanation, such as risk, liquidity, or the bid-ask spread was found for the excess returns *(Fung, Lam, & Lam, 2010)*.

The overreaction hypothesis holds for the Chinese stock market, on both the short-term (one day to one month) and the long-term (one year to five years). On a time frame of three to nine months the contrarian trading strategy produces weak or even negative results for the Chinese stock market *(Wu, 2011)*.

Support for the overreaction hypothesis has also been found on less matured stock exchanges. Both the directional effect and the magnitude effect have been identified on the Egyptian stock Exchange when tested over the period of 1999-2010. In this period price reversals have been observed two to three days post the previous lower limits *(Farag, 2015)*. In a previous study Farag also found evidence of price reversals following a dramatic 1-day change of price of a company on the Egyptian stock exchange *(Farag, 2014)*. The JSE Stock Exchange of South Africa exhibits mean reversals for portfolios with a 12-month and 36-month formation period, when tested over the period 1993 to 2009. In this study it was also found that the losing portfolios exhibited a much stronger reversal than the winning portfolios *(Hsieh & Hodnett, 2011)*.

2.2.3 Recent publications on the magnitude effect

The magnitude effect, which de Bond and Thaler *(1985)* were not able to find empirical evidence of, has been tested by other researchers, subsequent to the papers by de Bond and Thaler. Despite that several studies show that the magnitude effect is likely to exist, little evidence has been provided that is statistically significant. The small amount of statistical significant evidence is likely caused by the complication that arises when testing the magnitude effect. When testing the magnitude effect, the duration of the magnitude effect may depend on the formation period. As a result, the associated magnitude effect should be measured for specific time periods *(Fung, Lam, & Wong, 2013)*.

The study performed by Fung, Lam & Lam *(2010)*, to test the Singaporean, South Korean, Hong-Kong, Taiwanese, and Japanese market for overreaction due to overnight performance of the US market, yielded statistical significant evidence for the magnitude effect. Fung, Lam, & Wong *(2010)* found support of the magnitude effect for the Japanese and Taiwanese market with a 1% confidence interval of a one-tailed test. The magnitude effect on the Singaporean, Hong-Kong and Korean markets were only statistically significant at a 10% confidence interval of a one-tailed test.

Fung, Lam, & Wong (2013) tested the directional effect and magnitude effect for extreme, medium and mild winner-loser portfolios of the US equity market for the period 1990 to 2009 on a wide range of formation periods. By applying three statistical tests and a robustness test, Fung, Lam, & Wong *(2013)* found statistical significant support for the directional and magnitude effect with a 1% confidence interval for portfolios with a formation period of both one and two weeks. Portfolios with a longer formation period yielded no statistical significant results, with the exception of a three-year formation period, which was statistically significant at a confidence interval of 5%.

2.3 Key takeaways

As seen in chapter 2.1, there is little evidence against the weak form efficiency for financial markets of developed countries, while there are a number of studies that support the weak form efficiency for the financial markets of developed countries. More evidence is presented that does not support the efficient market hypothesis, when looking at financial markets in newly industrialized countries and emerging markets. Therefore, in order to contribute to the literature surrounding the weak form efficiency, the MOPOI trading algorithm will be written and tested on the financial markets of developed countries. A potent algorithm for financial markets of developed countries could lead to evidence against the weak form efficiency. Such evidence is only scarce for financial markets of developed countries, therefore these financial markets are deemed most interesting to be tested using a trading algorithm.

The key takeaways from chapter 2.2 are that there is reason to believe that both the directional effect and the magnitude effect exist, as literature provides statistical significant evidence in favour of both hypotheses. Evidence for the directional effect has been found for the short-term of 1-day to 1-month, as well as the long-term. Based on the studies mentioned in chapter 2.2, there is reason to assume

that an algorithm that identifies overreactions, and trades the following reversals subsequent to an overreaction, may outperform the market. Another takeaway from chapter 2.2 is that reversals following a downward overreaction are most likely the easiest to trade, as they show stronger reversals than reversals following a upward overreaction *(Hsieh & Hodnett, 2011;* Lobe & Rieks, 2011*)*.

3. The MOPOI algorithm

3.1 Underlying formula

The first hypothesis of the overreaction hypothesis states that "Extreme movements in stock prices will be followed by subsequent price movements in the opposite direction" *(De Bond & Thaler, (1985), p. 795)* (later labelled as the Directional effect (Brown & Harlow, 1988)). The Martin Odink Pessimism Overreaction Identifier (MOPOI) algorithm has been designed to identify downward overreactions on the underlying asset, and to signal entry levels at the moment of reversals following an overreaction. The MOPOI algorithm focuses on downward overreactions only, as prior studies have observed stronger reversals subsequent from downward overreaction, than from upward overreactions *(Hsieh & Hodnett, 2011; Lobe & Rieks, 2011)*. In order to identify a downward overreaction on the underlying asset, the MOPOI algorithm executes two formulas: 1) a formula with which the MOPOI algorithm assigns a downward volatility level to each trading day of the underlying asset, and 2) a formula with which the MOPOI algorithm plots a threshold level, named the MOPOI line, over a moving average of the downward volatility level. The MOPOI line is calculated based on a number of standard deviations off of the moving averages of the downward volatility levels. A downward overreaction on the underlying asset is assumed for that trading day when the assigned downward volatility level on a given trading day is larger than the MOPOI value for that trading day.

3.1.1 Downward volatility levels

Downward volatility on the underlying asset for each trading day is measured by assigning a Williams Vix Fix (WVF) level to each trading day. The Williams Vix Fix is a synthetic VIX that has been designed by Larry Williams *(Williams , 2007)*. The VIX, also known as the fear index, represents the market's expectation of the market volatility over the next 30-day period *(Hancock, 2012)*. In this study the WFV is used as the WVF generates parallel behaviour to the VIX, but in contrary to the VIX the WVF can easily be computed for any underlying asset. The original formula of the WVF has been formulated as follows *(Williams , 2007, p. 30)*:

$$\textbf{\textit{WVF}} = (\textit{Highest close[close, 22]} - \textit{Low}) / (\textit{Highest [close, 22]}) * 100$$

Which, in order to find the WVF value for a specific date in time, has been rewritten as:

$$\textbf{WVF}_{t+n} = (HC\,[_{t+n}\text{ to }_{t+n-21}] - L_{t+n}) / (HC\,[_{t+n}\text{ to }_{t+n-21}]) * 100$$

Where:

t = Time in trading days
n = Date, where today = 0 and every trading day prior subtracts 1
HC = Highest close found within the period t
L = Low of the day

3.1.2 MOPOI levels

With a WVF value assigned to each trading day, a formula can be designed that captures exceptional downward volatility movements on the underlying equity market. This is done through a method that is similar to plotting Bollinger Bands. First, a moving average is calculated based on the WVF levels of each trading day. From this moving average an upper level is plotted (the MOPOI line), which is an in this research identified number of standard deviations from the moving average. The idea being that overreaction occurs on the underlying asset when the WVF level of a given trading day is higher than the MOPOI level on the same trading day. The overreaction is assumed as the decline of the underlying equity market can be labelled as exceptionally strong for the current levels of volatility on the underlying asset. The formula to calculate the MOPOI levels has been formulated as follows:

MOPOI $_{t+n}$ **=**

$$\left(\frac{\sum_{n=-y+1}^{0}(WVFt+n)}{y}\right)+\left(z*\sqrt{\frac{\left(\sum_{n=-y+1}^{0}(WVFt+n)\ -\sum_{n=-y+1}^{0}(WVFt+n\ /\ y)\right)^{2}}{y-1}}\right)$$

Where:

t = Time in trading days
n = Date, where today = 0 and every trading day prior subtracts 1
y = Length of moving average WVF in trading days
z = Number of standard deviations

Two variables need to be identified in order to plot the MOPOI line: 1) the number of trading days used to plot the moving average of the WVF values (from here on forward referred to as variable y), and 2) the number of standard deviation from which the MOPOI line is plotted over the moving average (from here on forward referred to as variable z). The values for variable y and variable z will be determined within this paper. The methodology used to identify the values for variable y and variable z can be found in chapter 4.1.1.

3.2 Using the MOPOI algorithm

3.2.1 Entering a long position

Overreaction on a given trading day is assumed when the WVF of that trading day exceeds the MOPOI value of that same trading day. Based on the directional effect, a reversal movement is expected subsequent to the overreaction *(Brown & Harlow, 1988; De bond and Thaler, 1985)*. The remaining problem is that it is unknown when the reversal will be initiated. Literature suggests that the directional effect appears to be the strongest within a time frame of one day to one month *(Fung, Lam, & Lam, 2010)*. However, literature does not provide a precise moment when a reversal is initiated, nor how long a reversal last.

In order to trade a reversal subsequent to an overreaction on the underlying asset, a long position will be opened at the moment when overreaction is no longer assumed on the underlying asset. As the WVF values are calculated based off of the lows of the current trading day, it is not possible to determine intra-day whether an overreaction is assumed on the underlying asset at the close of that trading day. Therefore, a long position is signalled for the open of a trading day when at the close of the previous trading day for which no overreaction was assumed, while at the close of the trading day prior to that trading day overreaction was assumed. This can also be stated as: enter a long position at the open of t+0 when both of the following statements are true:

- $WVF_{t-2} > MOPOI_{t-2}$
- $WVF_{t-1} < MOPOI_{t-1}$

3.2.2 Visualisation of the MOPOI algorithm

The MOPOI algorithm has been coded in Tradingview.com for testing and trading purposes. The coded version of the MOPOI algorithm, however, also allows for visualizing the formulas that have been stated in chapter 3.1.1 and 3.1.2. Figure 1 provides an illustration of the coded MOPOI algorithm, for the S&P 500, for the period of August 2014 to year-end for 2014.

The length of the red and yellow bars illustrate the WVF values for that given trading day, which have been calculated according to the formula of chapter 3.1.1. The WVF values in figure 1 have been multiplied by -1 for a more intuitive illustration. The green line represents a moving average of these WVF values, which is calculated by the first part of the formula as found in 3.1.2. The blue line is the MOPOI line, which represents the threshold level with which overreaction of the underlying asset is assumed. When a bar does not exceed the blue line (WVF < MOPOI) then no overreaction is assumed and the bar will remain red. When the bar exceeds the blue line (WVF > MOPOI) then overreaction is assumed on the underlying asset, and the bar turns yellow. A long position will be entered at the open of the trading day subsequent to the first red bar that followed up a yellow bar.

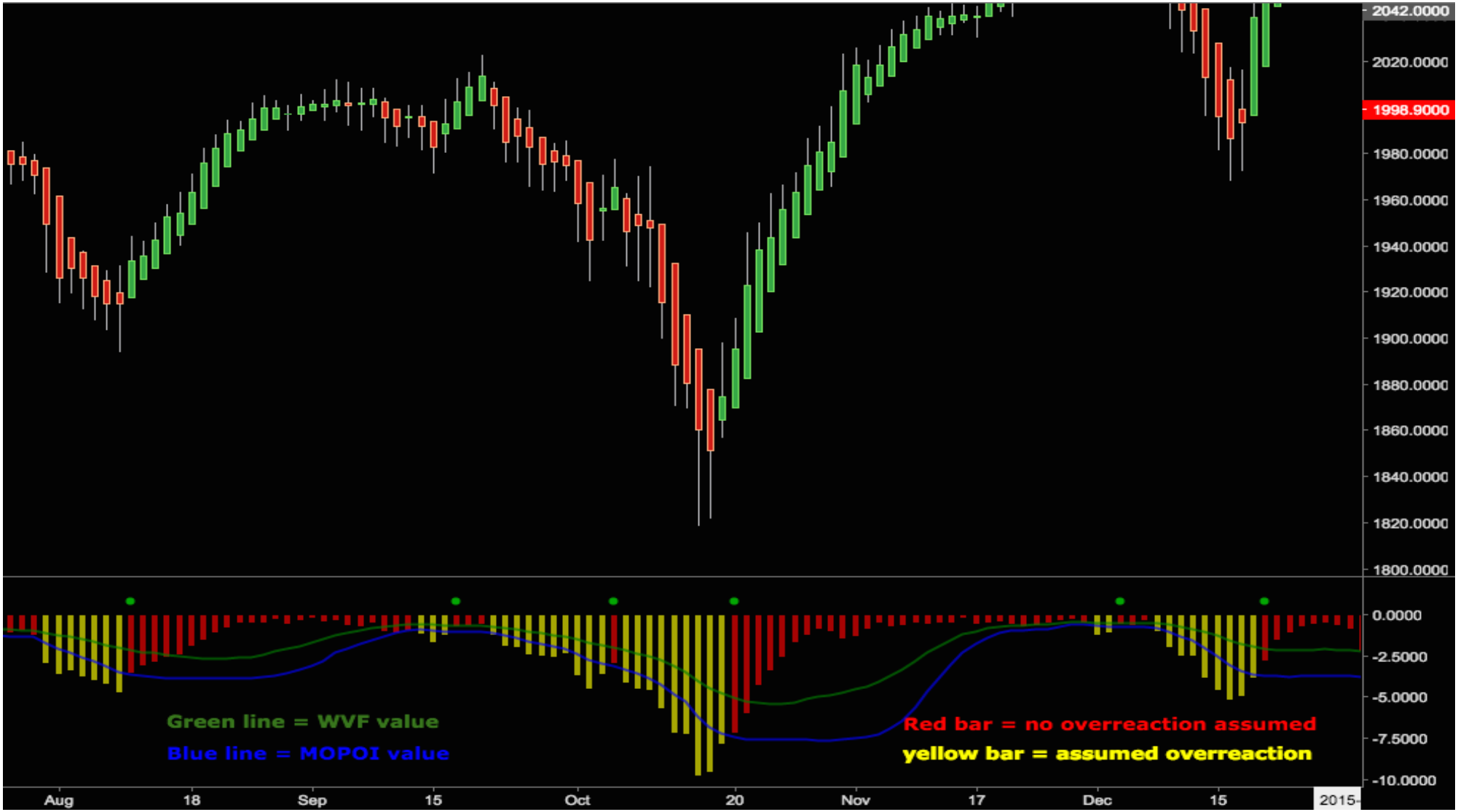


Figure 1: Visualisation of the coded MOPOI algorithm

3.3 Conditions within the MOPOI algorithm

Prior to testing the MOPOI algorithm, potential errors have been identified in times of long-lasting upward movements and times of flat movements of the underlying asset subsequent to a downward movement. In order to account for these potential errors four conditions have been formulated, which may account for the potential errors that have been identified. An elaboration of the potential errors and the formulated conditions can be found in the remainder of chapter 3.3.

3.3.1 Condition 1

WVF values become close to, or reach zero, when the underlying asset trades mainly flat and/or positive for 22 consecutive trading days. In such an event the MOPOI line closes in on the moving average over time. With WVF values close to zero for a longer period, the moving average of the WVF values will reach levels close to zero as well. In this event a relatively small decline of the value of the underlying asset can generate higher WVF values than the MOPOI line, and thus signal overreaction on the underlying asset. A relatively small decline of the value of the underlying asset is, intuitively, not associated with overreaction.

In order to account for such potential false signals, a minimal WVF value at $_{t-2}$ will be set. By setting a threshold level of the WVF at t-2, it is assured that the underlying asset at t-2 dropped at least a certain percentage from the highest point over the last 22 trading days. By setting a threshold at e.g. 1% it is assured that no trigger takes place when the underlying asset declines less than the set threshold over the period of the highest level in the last 22 trading days and the low of t-2.

The optimal threshold level is yet unknown for the MOPOI algorithm, therefore it will be sought after in this research paper. Condition one thus imposes that an entry signal is only provided when the following additional statement is true:

- WVF value at close of t-2 > the set WVF threshold level

3.3.2 Condition 2

The MOPOI algorithm could potentially generate a false signal when the underlying equity market moves sideways after a decline of the price of the underlying asset. In this event the WVF can fall back below the MOPOI line without an appreciation of the underlying equity market. This can occur due to the WVF value decreasing at a higher pace than the MOPOI value. This situation occurs when the highest close value is replaced by a new and lower highest close, due to the old highest close falling out of the 22 trading days range. Adding a condition in which the close of the underlying asset at t-1 is higher than the close at t-u can generate a possible solution to these false signals. In this case u stands for one plus an unknown number of trading days prior to the close at t-1. Whether condition two will improve the effectiveness of the MOPOI algorithm, and which value should be assigned to u is unknown, and will be investigated in this research paper. Condition two thus imposes that an entry signal is only provided when the following additional statement is true:

- WVF at close of t-1 > WVF at close of t-u

3.3.3 Condition 3

Condition three is imposed to control for the same potential false signal as condition two, however, condition three demands for a stricter confirmation of a reversal. For condition three the close at t-u is not compared to t-1, but each close of the day following t-u must be higher than the day that it follows up. Condition three is added on top of condition two, as condition three may account for the false signal better than condition two does, as condition three demands for a stronger reversal pattern than condition two does. However, condition two is not excluded due to the concern that condition three may be too strict and therefore condition three could potentially filter out many good trades as well, and in result decrease the yield of the MOPOI algorithm.

3.3.4 Condition 4

The MOPOI trading algorithm can signal a new entry position at a point in time when a long position is open on the same underlying asset. This may occur when long entry signals are signalled fairly close upon one another. The question arises whether multiple simultaneously opened long positions should be allowed for the same underlying asset, as the long positions have been generated based on one the same decline of the value of the underlying asset. In order to account for this potential error, condition four imposes a restriction on the maximum number of open long positions to one open long position. Whether condition four improves the efficiency of the MOPOI algorithm is unknown and will be investigated in this research paper.

3.4 Unidentified parameters

To summarize, the following six parameters need to be identified in this study before a buy and sell strategy can be assigned to the MOPOI trading algorithm.

- A value for variable y
- A value for variable z
- A value for the minimum WVF threshold (condition 1)
- The number of days to confirm the reversal for condition two
- The number of days to confirm the reversal for condition three
- Whether a restriction of the maximum number of simultaneously opened position set at one, improves the efficiency of the MOPOI algorithm.

4. Methodology

In order to be able to put the MOPOI trading algorithm to use, the unidentified parameters from chapter 3.4 need to be identified, and a buy and sell strategy needs to be formulated. In this master thesis the identification process of the undefined parameters of chapter 3.4 and the buy and sell strategy has been divided in three parts, which follow each other up in a chronological order. By doing so the number of possible combinations is greatly reduced, which reduces the time required to gather and process the data within an acceptable time span for this master thesis. By reducing the number of combinations, however, there is a possibility that certain combinations that yield a higher geometric return than the combination identified within this master thesis, are not captured by this methodology. The three parts in which the undefined parameters from chapter 3.4 and the buy and sell strategy will be identified are the following:

1. Identifying values for variable y and variable z.
2. Identifying values for condition one, two, three, and four, for the MOPOI trading algorithm with the values for variable y and variable z that have been identified in the previous part.
3. Identifying a buy and sell strategy for the MOPOI trading algorithm with the parameters and conditions that have been identified in part one and two.

All the parameters will be derived based on the opening prices, closing prices, intraday highs and intraday lows of the S&P500, which will be obtained through Tradingview.com. The S&P500 has been selected as input to identify the parameters, as the S&P500 is supposed to be efficient according to literature (Ellis & Parbery, 2005; Marshall, Cahan, & Cahan, 2008), while no evidence has been found in literature that suggests that the S&P500 does not comply with the weak form of the efficient market hypothesis. Therefore, the historical price data of the S&P500 is ought to be a valid dataset from which a trading algorithm can be created that outperforms financial markets that are ought to be weak form efficient. The data from Tradingview.com is deemed reliable, as Tradingview.com has a direct data feed from the exchanges. Furthermore, Tradingview.com has been selected, as Tradingview.com is the only, to the author known, platform in which algorithms can be coded and plotted on charts. By writing the MOPOI algorithm in code and plotting the algorithm, time can be saved and human errors can be reduced.

4.1 Identifying the parameters for the MOPOI trading algorithm

4.1.1 Identifying variable y and variable z

In order to finalize the MOPOI trading algorithm, variable y and variable z need to be identified. Variable y and variable z need to be identified in a manner that the values, that are assigned to variable y & z, are values that make the MOPOI trading algorithm as efficient as possible in timing the reversals following a downward overreaction on the underlying asset. Herein lies the challenge that variable y and z will be identified without testing for every possible combination between

these two variables, conditions, and buy and sell strategies. Therefore, the following method to identify variable y and variable z will lead to a best guess of the optimal values for variable y and z, rather than the absolute optimal values.

A definition of an efficient MOPOI trading algorithm needs to be provided before a methodology can be created for identifying variable y and z. The purpose of the MOPOI trading algorithm is to generate the highest geometrical return off of downward overreactions, rather than to accurately identify possible reversals following a downward overreaction. Therefore, an efficient MOPOI trading algorithm is not defined through accuracy alone, but by an equilibrium of frequency of the signals and the accuracy of the signals. The equilibrium problem can be explained through the following illustration:

Illustration: Under the assumption that a signal provided by the MOPOI trading algorithm will either result in a 2% gain or a 2% loss, and accuracy of the MOPOI trading algorithm is defined as the percentage at which a signal results in a gain, the following scenario's lead to the following returns over a year:

	Accuracy:	***Frequency of signals per year:***	***Geometric return over a year:***
Scenario 1:	100%	1	2.00%
Scenario 2:	80%	10	12.53%
Scenario 3:	50%	20	-0.40%

Table 2: Illustration equilibrium problem

The above illustration clearly shows that neither the highest level of accuracy nor the highest frequency of signals will automatically lead to the highest return. The MOPOI trading algorithm efficiency is expressed in maximizing geometric returns, rather than maximizing accuracy or frequency. Therefore, values for variable y and variable z need to be identified that accounts for the desired equilibrium between the accuracy of the MOPOI trading algorithm and the frequency of the signal produced by the MOPOI algorithm.

Transaction costs will be taken into account while determining variable y and z. Transaction costs need to be accounted for at this stage of the research, as the geometric return is negatively influenced by an algorithm with a higher frequency of triggers, which is accounted for by taking transaction costs into account at this stage. There is no precise historical transaction cost readily available for the period 1991 to 2015. Pollin & Heintz (2011) performed a literature review to find an estimate of transaction costs, and acquired data from Elkins/McSherry and Markit. These are two leading private business firms that gather financial data directly from market participants. For the period 1987 to 2011 they state that between 25 and 50 base points is a reasonable estimate for a two-way transaction costs for a trade on the U.S. stock markets. Therefore, this report will use the mean of the range of the estimate of Pollin & Heintz (2011) as transaction costs, which is 37.50 base points for a two-way transaction.

Variable y and variable z will be identified by running a variety of possible combinations, of variable y & z, on the S&P500 for the period 01/01/1991 to 31/12/2015. The range for variable y has been set at 17 to 25 trading days, with an interval of 1 trading day. A range of 17 to 25 trading days has been selected as oscillators, based on charts with daily intervals, usually generate the best results when using a value between 20 and 22 trading days *(Williams , 2007)*. By taking a range of 17 to 25 trading days, the optimal value for variable y is likely included within the investigated range, while limiting the number of combinations that need to be processed.

The range for variable z has been set at 1.0 to 3.0 standard deviations, with an interval of 0.2 standard deviations. A wide range has been selected for the number of standard deviations, as no indication has been found on what the optimal number of standard deviations is for algorithms similar to the MOPOI algorithm. In order to identify an approximation of the best combination of values for variable y and variable z, a summated return has been calculated of all the percentage returns between the open of the underlying asset at t+0, and the close of the underlying asset at t+3 for all investigated combinations of variable y and variable z. The combination of variable y and variable z with the highest summated return over the period 01/01/1991 to 31/12/2015 on the S&P500 will be assigned to MOPOI algorithm. In the event that a combination is selected in which variable y and/or variable z is a value at the edge of the aforementioned ranges, then the range will be widened with the corresponding aforementioned interval for variable y and variable z. This will be done until the newly explored combinations resulted in a lower summated return than the highest returning summated return that has been found up to that point in time.

The aforementioned scoring mechanism takes into account the equilibrium problem between the accuracy and frequency for the MOPOI trading algorithm. This is done as a higher frequency allows for a higher score, but with a low level of accuracy the accumulation of negative returns will offset the accumulation positive returns. This method also takes into account the magnitude effect, by summating the returns of percentage points, rather than assigning a fixed value for a correctly identified reversal.

4.1.2 Identifying parameters conditions

In chapter 3.3 four conditions to the MOPOI algorithm have been formulated. These four conditions will tested as follows:

Condition 1: The aim of condition one is to identify a WVF value at t-2 that serves as a threshold level that improves the effectiveness of the MOPOI algorithm. Such a threshold level will be soughed after by adding a threshold level, of a WVF value at t-2, to the MOPOI algorithm, for which variable y and variable z is set at the previously found values. The threshold levels that will be tested are all levels within the range of 0.0 and 10.0 with an interval of 0.1. The coded MOPOI algorithm will be run in Tradingview.com with the previously found parameters for variable y and z, in order to identify all entry moments without a threshold level. Thereafter, all the percentage returns of t+0 to t+3 for all identified entry levels will be summated in

Microsoft Excel. Thereafter, for all 100 tested threshold levels, entries will be excluded when the WVF value at t-2 was lower than the tested threshold level. The threshold level with the highest summated return, after transaction costs, of all the percentage returns of the traded periods of t+0 to t+3 will be taken up for further testing for possible synergies before being adopted. A cut-off point of threshold level of WVF values at 10 is deemed sufficient, as at this level the market dropped by at least 10% over the last 22 trading days. With such market movements, possible errors due to scenarios as described in chapter 3.3.1 are no longer possible.

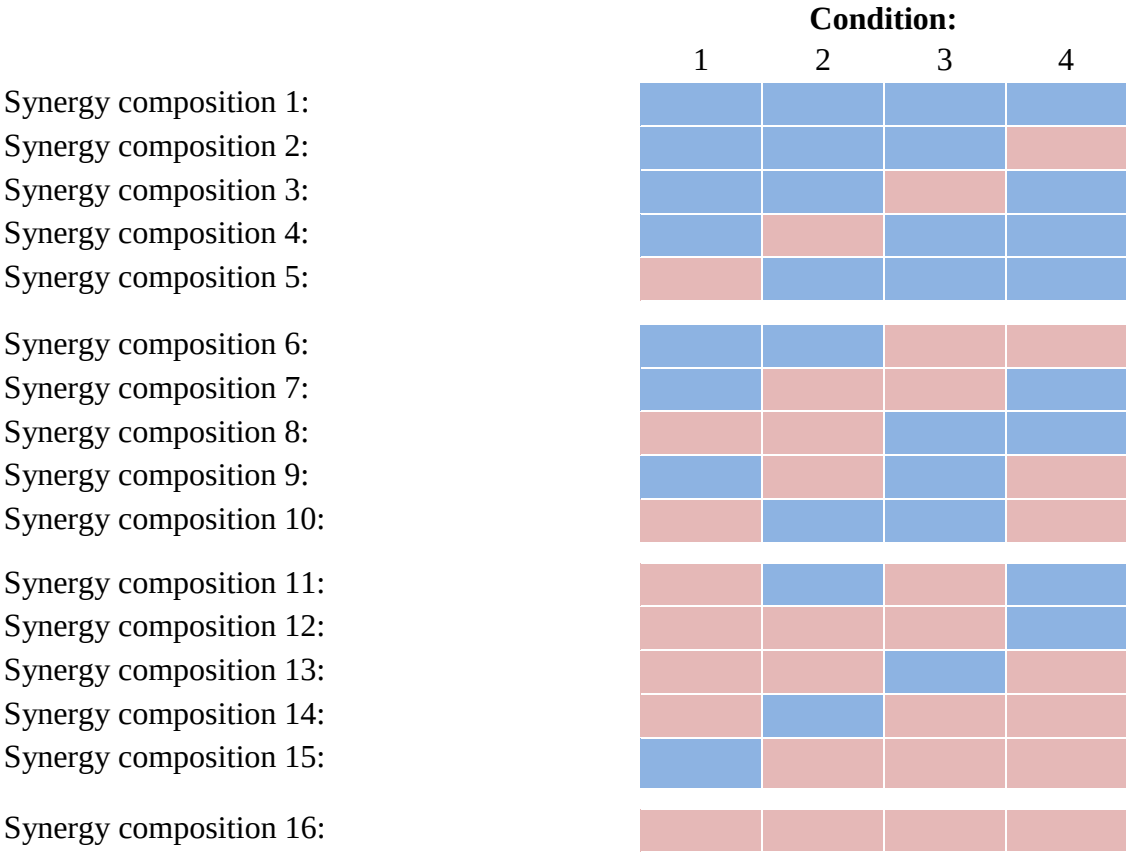
Condition 2: The aim of condition two is to test whether the MOPOI algorithm can be made more efficient by demanding a confirmation of the reversal. The confirmation of the reversal will be tested over the lower closes of the period t-2 to t-5 compared to the close at t-1. Condition two will be tested by identifying all entry moments and levels on the S&P 500 for the period 01/01/1991 to 31/12/2015, without demanding a confirmation of a reversal. This will be done via the coded algorithm in Tradingview.com. After identifying all entry moments and levels, all these moments will be put in Microsoft Excel and all summated percentage returns after a two way transaction costs of 37.5 base points will be calculated for the period 01/01/1991 to 31/12/2015. Thereafter, all these trades will be duplicated for all different look-back periods, and all trades for which the look-back criteria were not met will be excluded. Thereafter, a new summated return will be calculated for each tested look-back period. The look-back period with the highest summated will be taken up for further tested for possible synergies before being adopted.

Condition 3: Condition three has the same aim as condition two. However, with condition three the close levels in the period t-2 to t-5 are not compared to the close at t-1, but will be compared with the close of the previous day (e.g. t-5 is compared with t-4, instead of t-1, as its done with condition two). Condition three will be measured out using the same method as in condition two, by calculating all summated percentage returns of all look-back periods after excluding the trades that do not meet the inclusion criteria of condition three in Microsoft Excel. The look-back period with the highest summated return, after transaction costs, will be taken up for further testing for possible synergies before being adopted.

Condition 4: The aim of condition four is to identify whether restricting the number of simultaneously open positions on one underlying asset to one open position is improving the efficiency of the MOPOI algorithm. This is done by identifying all entry moments and levels via Tradingview.com, and exporting them to Microsoft Excel. Thereafter, all entry trades entered while another long position is open at that time will be excluded. The summated percentage returns will be calculated over the period of 01/01/1991 to 31/12/2015 for the S&P 500. The option with the highest summated return, after transaction costs, will be taken up for further testing for possible synergies before being adopted.

4.1.3 Synergy between the optimal conditions

The following sixteen compositions of possible synergies will be analysed in order to control for potential positive, or negative, synergy effects between the conditions:



Where:

= Included

= Not included

The MOPOI algorithm will adopt the synergy composition with the highest summated percentage return, after transaction costs, over the period 01/01/1991 to 31/12/2015.

4.2 Trading strategy MOPOI

Once the parameters, as well as the adopted conditions and the parameters for the adopted conditions, are known for the MOPOI algorithm, a range of buy and sell strategies can be tested for the MOPOI algorithm. With a buy and sell strategy included in the MOPOI algorithm, the MOPOI algorithm will be referred to as the MOPOI trading algorithm. In this research 97 buy and sell strategies will be tested. These buy and sell strategies will be categorized in three buy and sell methods. These three buy and sell methods can be found in table 3. All these 97 buy and sell strategies will be tested on the S&P 500 over the period 01/01/1991 to 31/12/2015. This will be done by identifying entry levels with the MOPOI algorithm, in which the parameters and conditions that have been identified for the MOPOI algorithm have been

included. A geometric return will be calculated for all 97 buy and sell strategies for the period 01/01/1991 to 31/12/2015. The highest geometric yielding buy and sell strategy, after transaction costs, at the moment of 31/12/2015 on the S&P will be adopted to the MOPOI trading algorithm.

		Strategy:	Range:	Interval:
Method 1:				
	Take profit:	Fixed percentage limit	+2% to +6%	0.5%
	Take loss:	Fixed percentage stop loss	-1% to -3%	0.5%
Method 2:				
	Take profit:	Fixed percentage limit	+2% to +6%	0.5%
	Take loss:	Lowest level prior "x" trading days	1 to 5 days	1 day
Method 3:				
	Take profit:	Close at "x" trading days after opening	1 to 7 days	1 day
	Take loss:	Close at "x" trading days after opening	1 to 7 days	1 day

Table 3: Buy and sell strategy testing format

The magnitude effect can be incorporated by scaling the size of the position opened to the WVF levels at t-2. In this study, however, no scaling of the opened positions is incorporated as this would be too time consuming, and would bring the workload outside the scope of the workload that is associated with a master thesis.

4.3 Data snooping bias

Data snooping describes the process where a set of data is analysed repeatedly without a priori hypothesis. The problem with data snooping is that it can result in significant findings that are nothing more than a chance artefact of repeated analyses of the data *(Salkind, 2010).* Data snooping is practically unavoidable when the research is conducted through an analysis of time-series data *(White, 2010).*

The price data of the S&P 500 is analysed repeatedly in order to identify the parameters that yield the highest summated return within the tested range for the MOPOI trading algorithm, and in order to identify the highest geometric returning buy and sell strategy within the sample. As no prior hypothesis is set on what likely the most efficient parameters or buy a sell strategy within the sample are for the MOPOI trading algorithm, the geometric return found on the S&P500 may not reflect the geometric return generating capacity of the MOPOI trading algorithm, as the geometric return found for the S&P 500 may be solely be the artefact of chance. Therefore, a countermeasure for data snooping biases will be included in this research.

A good way to avoid data snooping is to verify the results to another independent data set *(Salkind, 2010).* When the MOPOI trading algorithm outperforms the S&P 500 over the period 01/01/1991 to 31/12/2015, then the MOPOI trading algorithm is assumed to be able to outperform other equity markets as well. Therefore, in the event that the MOPOI trading algorithm outperforms, or shows potential to outperform the S&P 500, then the MOPOI trading algorithm will also be applied to the DJIA, DAX 30, CAC 40, FTSE 100 and the Hang Seng Index. By doing so the geometric return of the MOPOI trading algorithm on the S&P 500 is being verified. Conclusions drawn are therefore ought to be more reliable, as a larger range of equity markets, for which the geometric return of the MOPOI trading algorithm has been calculated, reduces the odds that conclusions are being drawn based on data that is nothing more than an artefact of chance.

5. Results

5.1 Variable y and variable z

Figure 2 provides an illustration of the summated returns for all the tested combinations of variable y and variable z prior to the inclusion of transaction costs at 37.5 base points. The combination of 1.0 standard deviations and 18 days for the moving average, returned the highest summated return when transaction costs were excluded (246.78%). As 1.0 standard deviations is at the edge of the tested range for the standard deviations, the combinations of 0.8 standard deviations and 18-19 days for the moving average were included in the sample. The summated returns of these two combinations were lower than 246.78%. Therefore, no further testing with 0.8 standard deviations was conducted at this stage.

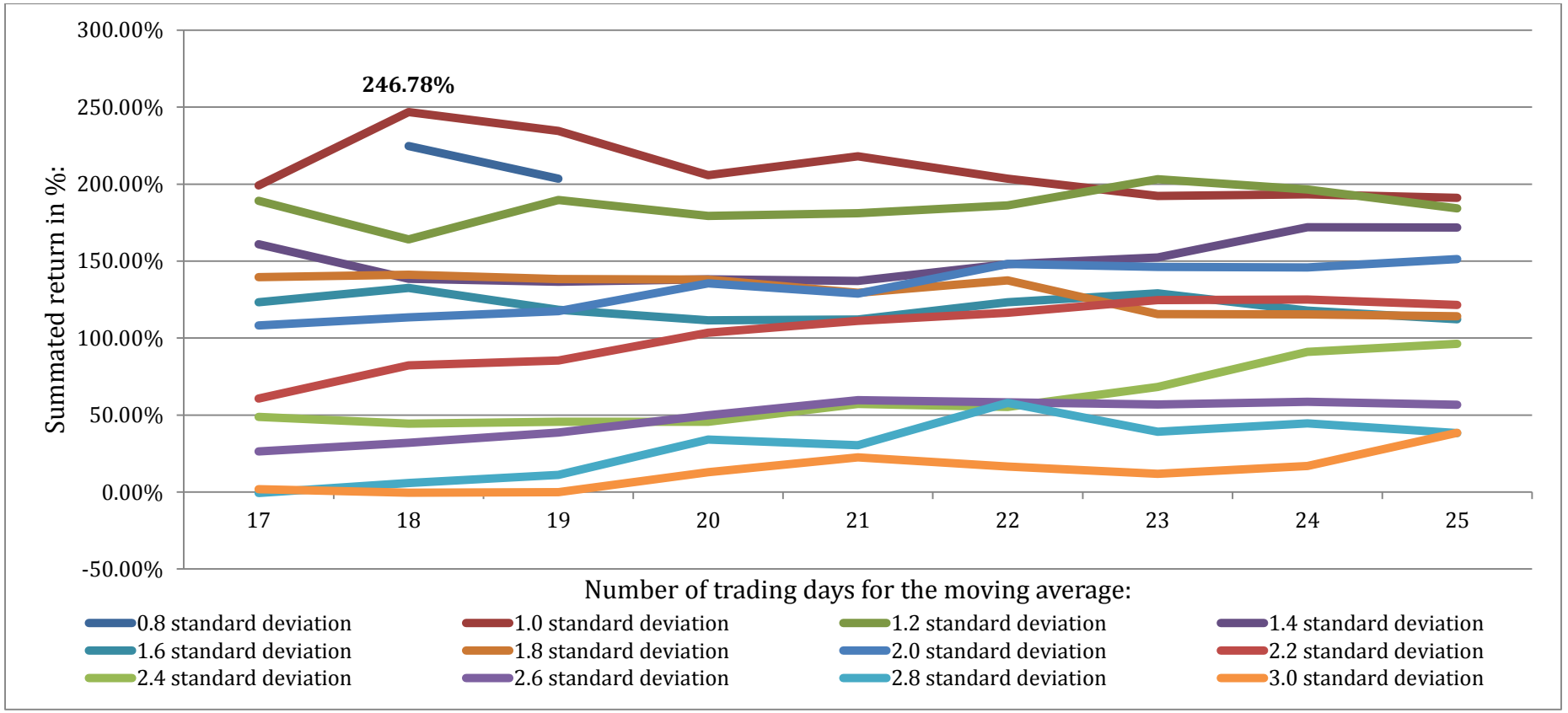


Figure 2: Summated returns variable y & variable z prior to transaction costs

Figure 3 provides an illustration of the summated returns for all the tested combinations of variable y and variable z after including transaction costs of 37.5 base points. After the inclusion of transaction costs at 37.5 base points the combination of 1.0 standard deviations and 18 days as the basis for the moving average remained to return the highest summated return. Therefore, at this point the combination of 1.0 standard deviations and a moving average based on 18 days was adopted for the MOPOI algorithm.

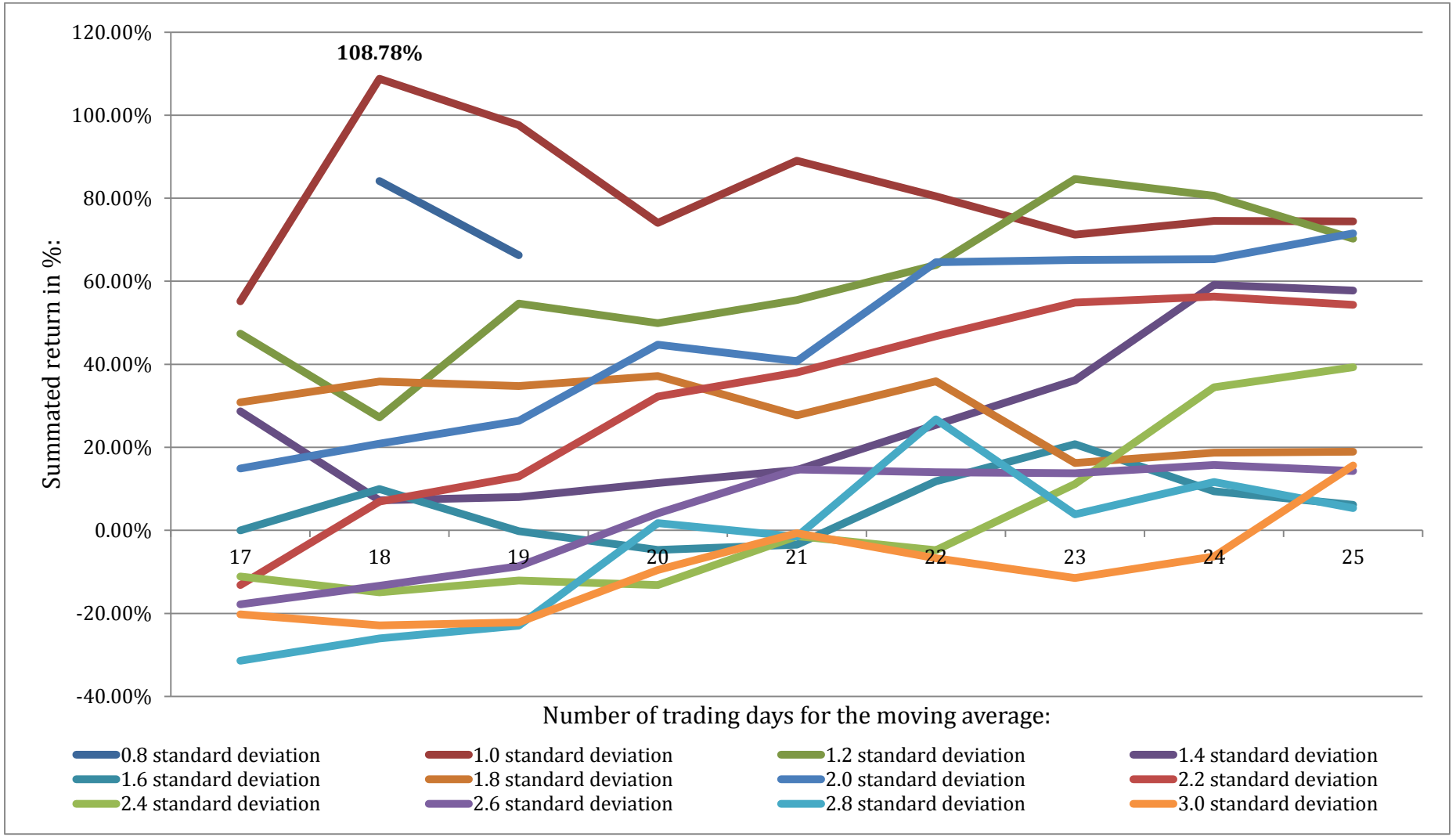


Figure 3: Summated returns variable y & variable z after including transaction costs.

5.2 Conditions

5.2.1 Condition 1

Figure 4 illustrates the summated returns found for each WVF threshold level when the WFV threshold levels at t-2 are included. The eight threshold values in the range of 0.0 to 0.7 returned the highest summated return of 108.87%. Therefore, including condition one does not appear to improve the efficiency of the algorithm and is not included in the MOPOI algorithm.

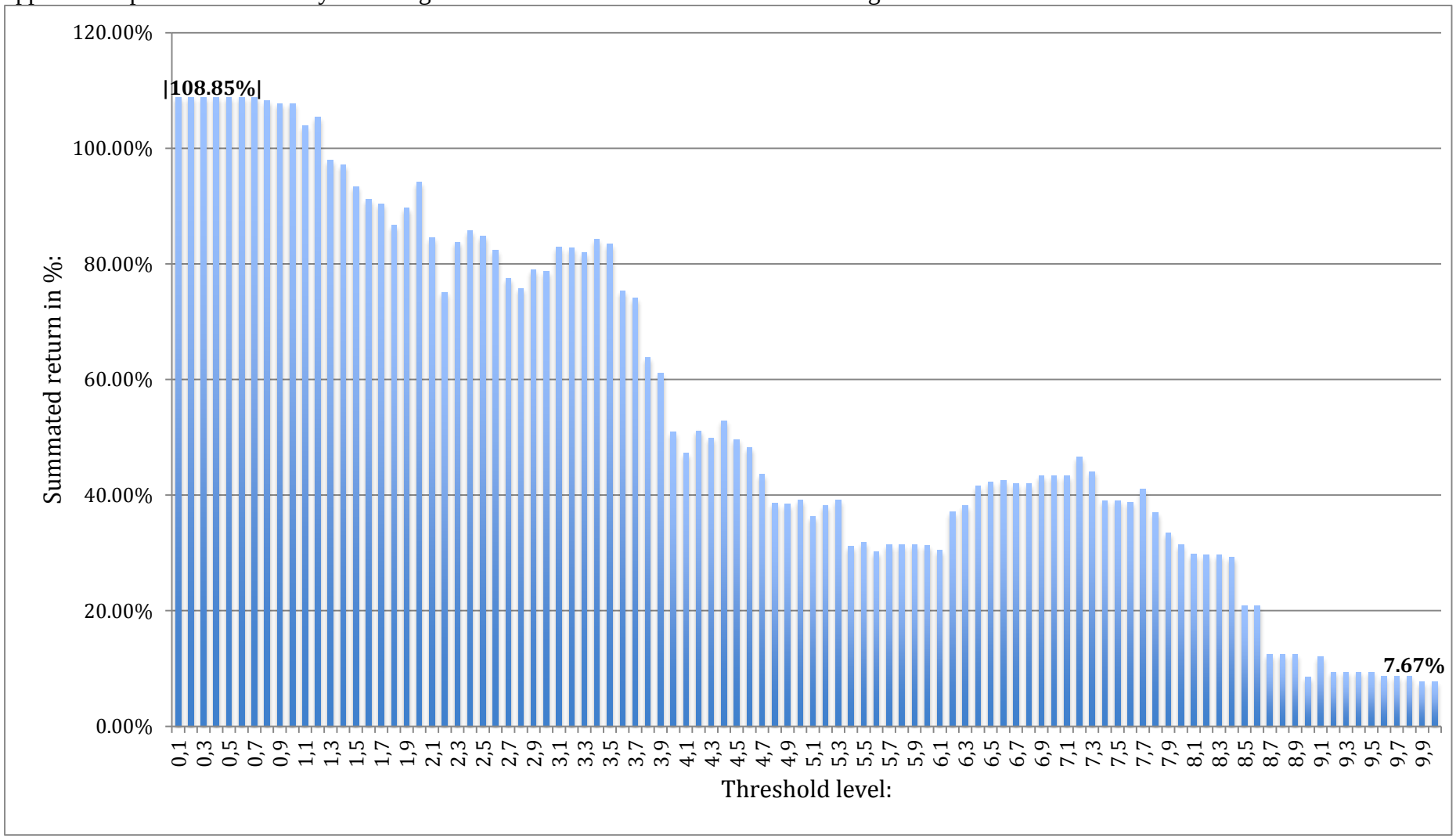


Figure 4: Summated returns after inclusion condition 1

5.2.2 Condition 2

Figure 5 provides an overview of the summated returns when condition two is included in the MOPOI algorithm for a look-back period of 0 - 4 trading days. A look back period of one trading day returned the highest summated return (120,08%). Therefore, condition two will be taken up for further testing for possible synergies before being adopted.

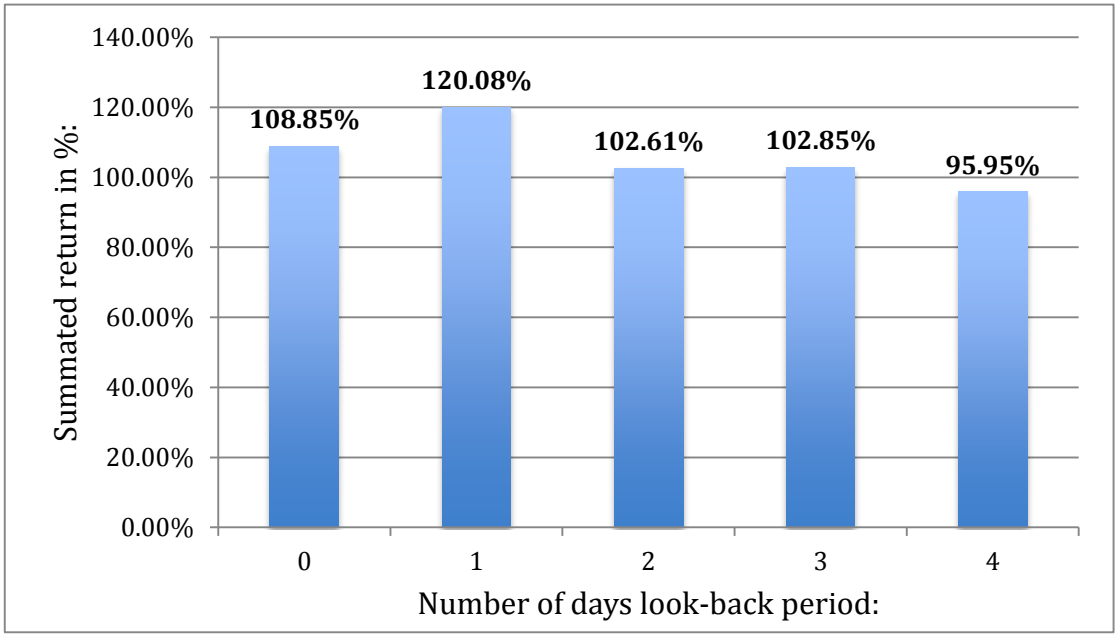


Figure 5: Summated returns after inclusion condition 2

5.2.3 Condition 3

Figure 6 provides an overview of the summated returns when condition three is included in the MOPOI algorithm for a look back period of 0 - 4 trading days. A look back period of one trading day returned the highest summated return (120,08%). As this look back period of one day is effectively the same as the one-day look back period of condition two, condition three has not been adopted.

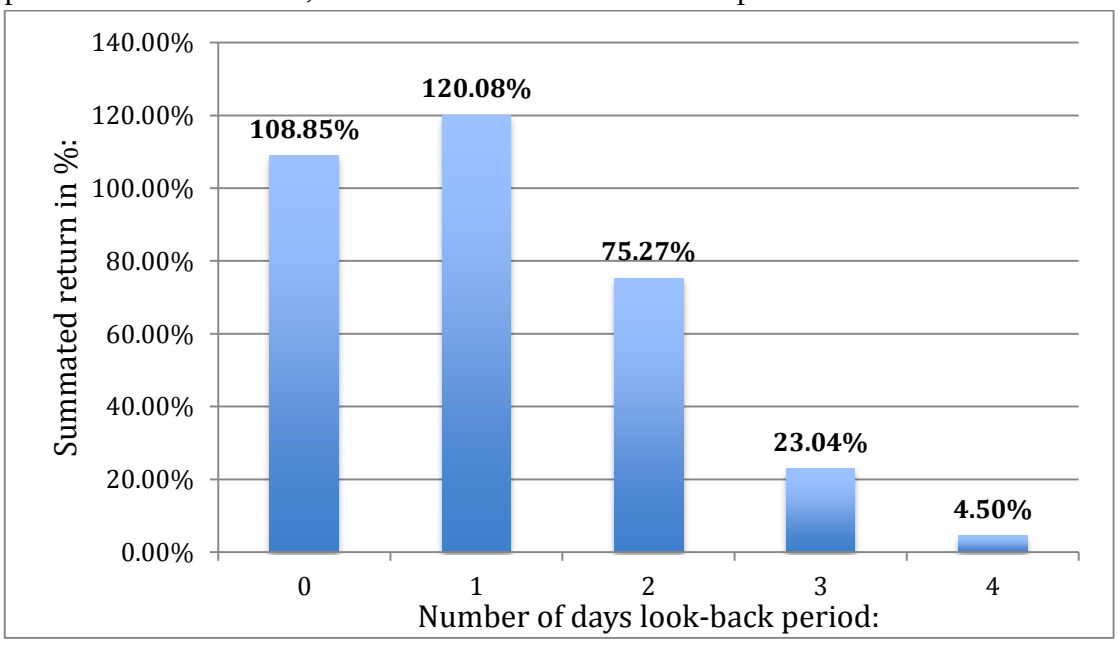


Figure 6: Summated returns after inclusion condition 3

5.2.4 Condition 4

Figure 7 shows the summated returns of both a restriction on the number of simultaneously opened long positions to one, and the summated return without such a restriction. The summated return without a restriction returned 108.85% vs. 84.67% for the summated return of the MOPOI algorithm with condition four included. Therefore, condition four has not been adopted.

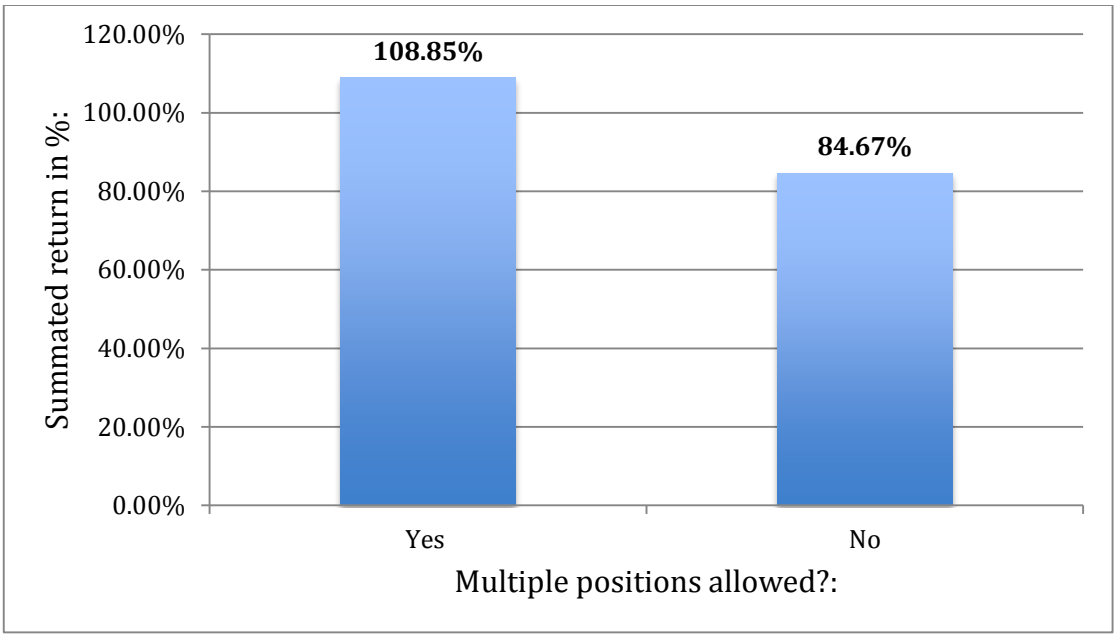


Figure 7: Summated returns after inclusion condition 4

5.2.5 Synergy between the condition

Only condition two has been adopted, with a look back period of one day. As condition one, three, and four have not been adopted there is no need to check for possible negative or positive synergies between the proposed conditions. The MOPOI algorithm will therefore be set with the parameters of 1.0 standard deviations, and 18 days to calculate the moving average. On top of that, the MOPOI algorithm will carry the condition that the close of the underlying asset at t-1 must be higher than the close of the underlying asset at t-2.

5.3 Buy and sell strategy

5.3.1 Buy and sell method 1

Figure 8 illustrates that, for method one of the proposed buy and sell strategies, selling at the close of the underlying asset at t+6 yields the highest geometric return, including two-way transaction costs of 37.5 base points. This trading strategy yields a geometric return of 261.68% over the period of 01/01/1991 to 31/12/2015 on the S&P500. With the highest recorded geometric return seen at the end of 2013 (313.04%).

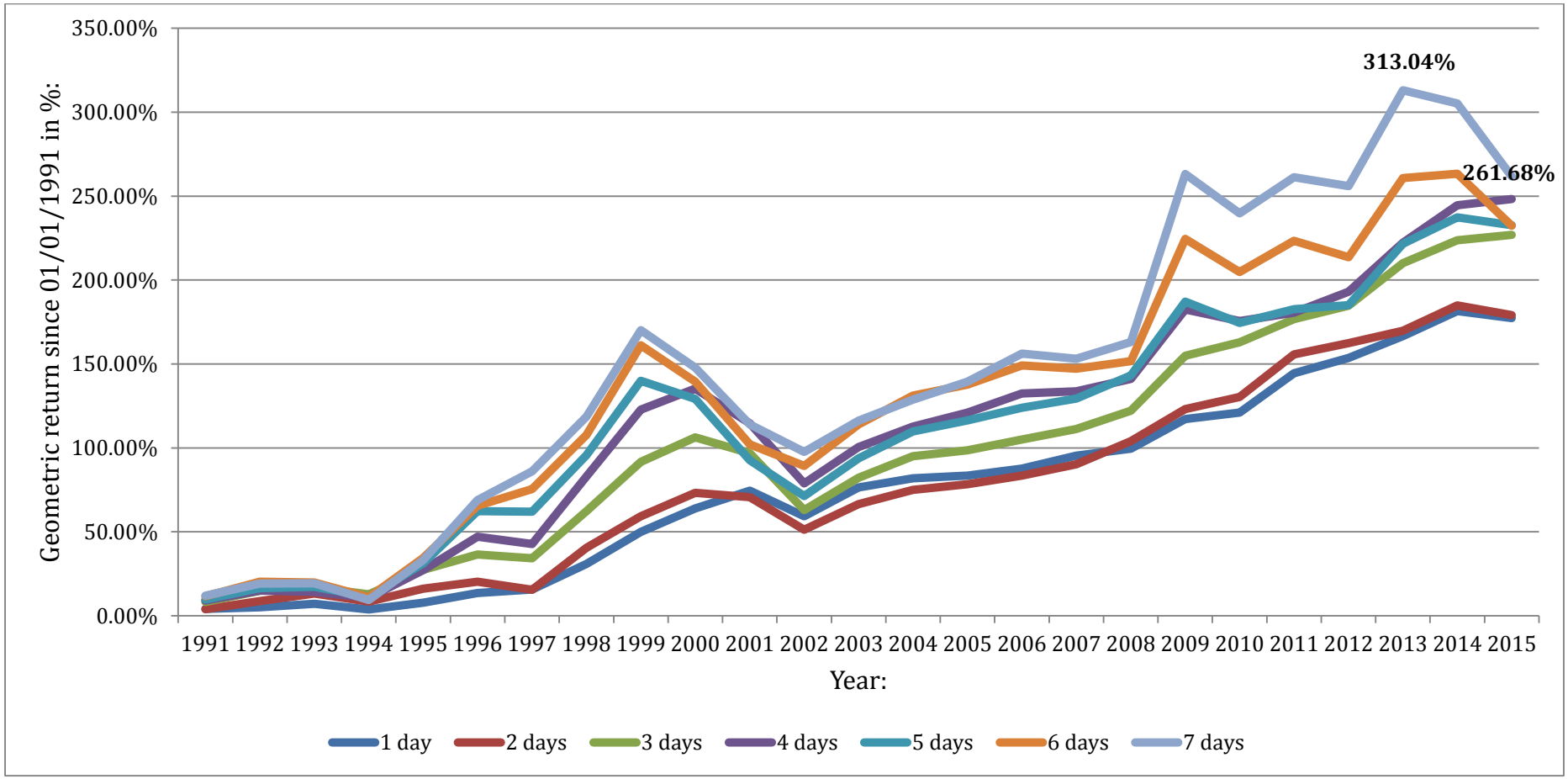


Figure 8: MOPOI buy and sell strategy method 1

5.3.2 Buy and sell method 2

Figure 9 illustrates that, for method two of the proposed buy and sell strategies, setting a limit at +6% from the open of the underlying asset at t+0, combined with a stop loss at -3% from the opening level at t+0, yields the highest geometric return for this buy and sell strategy. Doing so yielded a geometric return of 595.01% over the period 01/01/1991 to 31/12/2105 on the S&P500. The highest geometric return found for this method was over this period at the end of 2014 (1,039.71%).

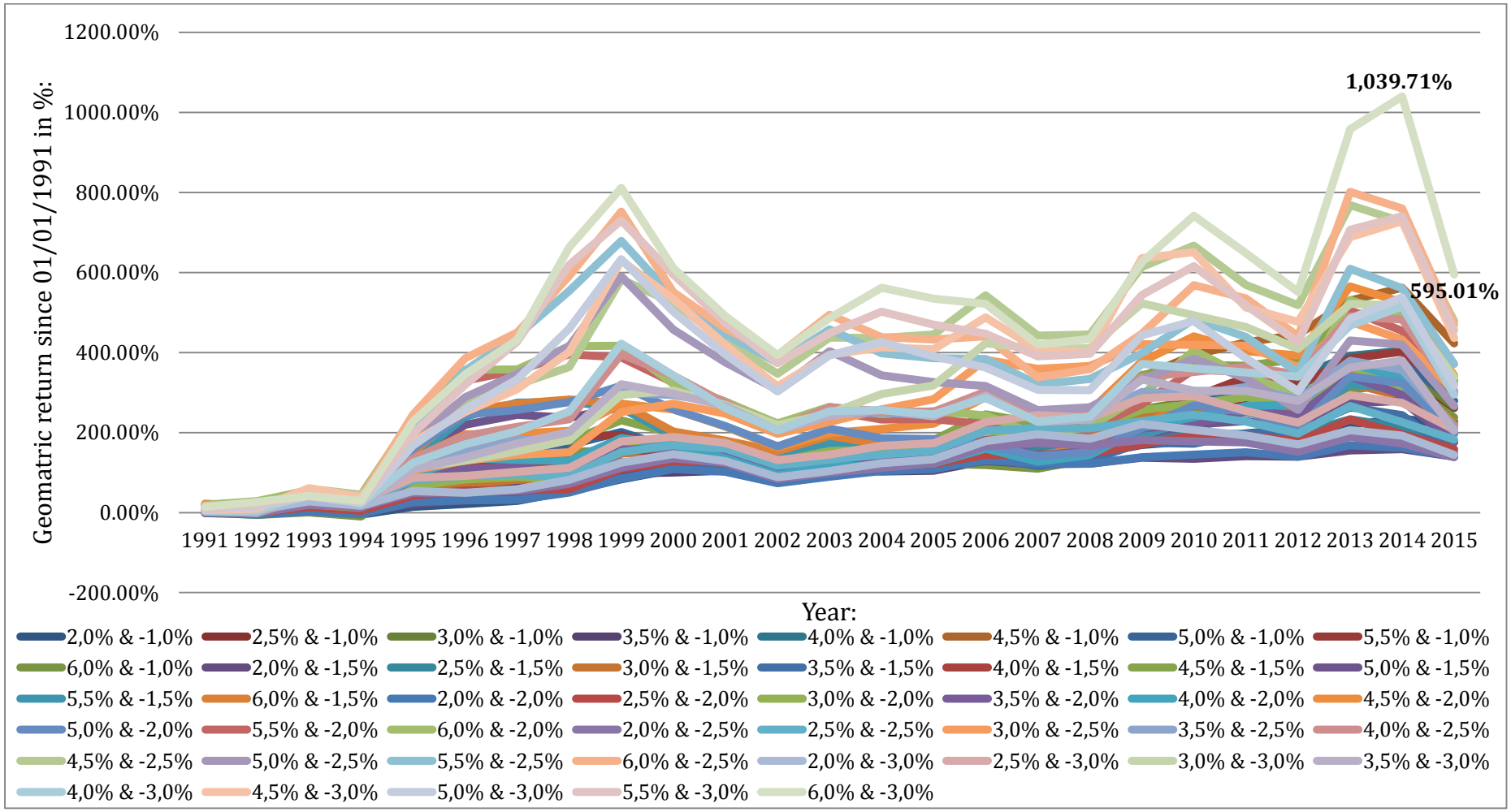


Figure 9: MOPOI buy and sell method 2

5.3.3 Buy and sell method 3

Figure 10 illustrates that, for method three of the proposed buy and sell strategies, setting a limit at +4.5% from the open of the underlying asset at t+0, combined with a stop loss at the lowest level at t-1, yields the highest geometric return for this buy and sell strategy. Doing so yielded a geometric return of 500.62% over the period 01/01/1991 to 31/12/2105 on the S&P500. The highest geometric return found with this method over this period was at the end of 2014 (603.48%).

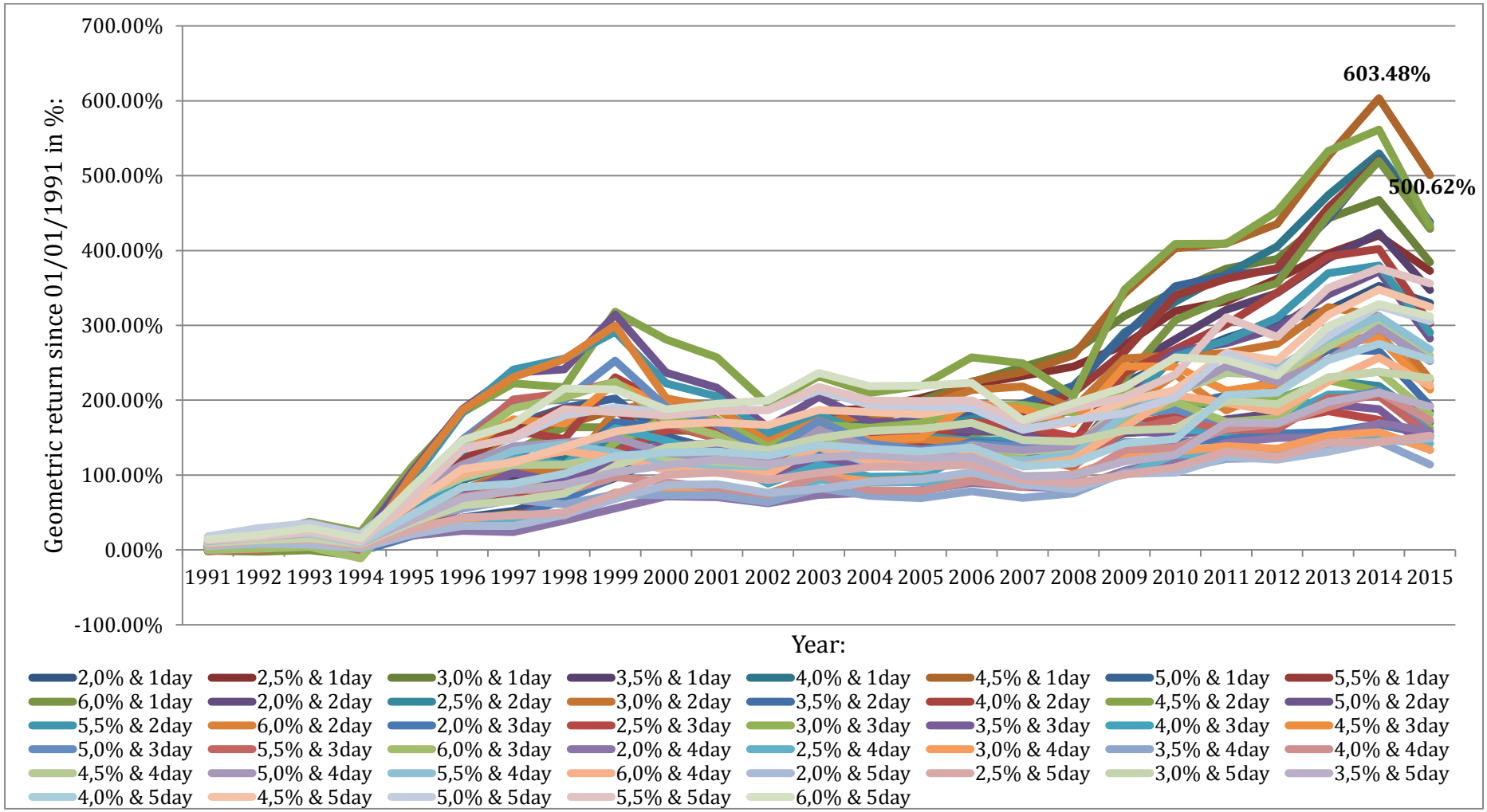


Figure 10: MOPOI buy and sell strategy - method 3

5.3.4 Buy and sell methods in perspective

Figure 11 provides an overview of the highest geometric yielding buy and sell strategies under the buy and sell methods one, two and three vs. the geometric return of the S&P500 over the period 01/01/1991 to 31/12/2015. Method two is the highest geometric yielding buy and sell method, and the only buy and sell method that managed to outperform the S&P 500, over the period 01/01/1991 to 31/12/2015 (S&P 500: 516.68% vs. method one: 216.68% vs. method two: 595.01% vs. method three: 500.62%). Therefore, the MOPOI trading algorithm will have its buy and sell strategy set as: a limit at +6% from the opening level of the underlying asset at t+0, and a stop loss at -3% from the opening level of the underlying asset at t+0.

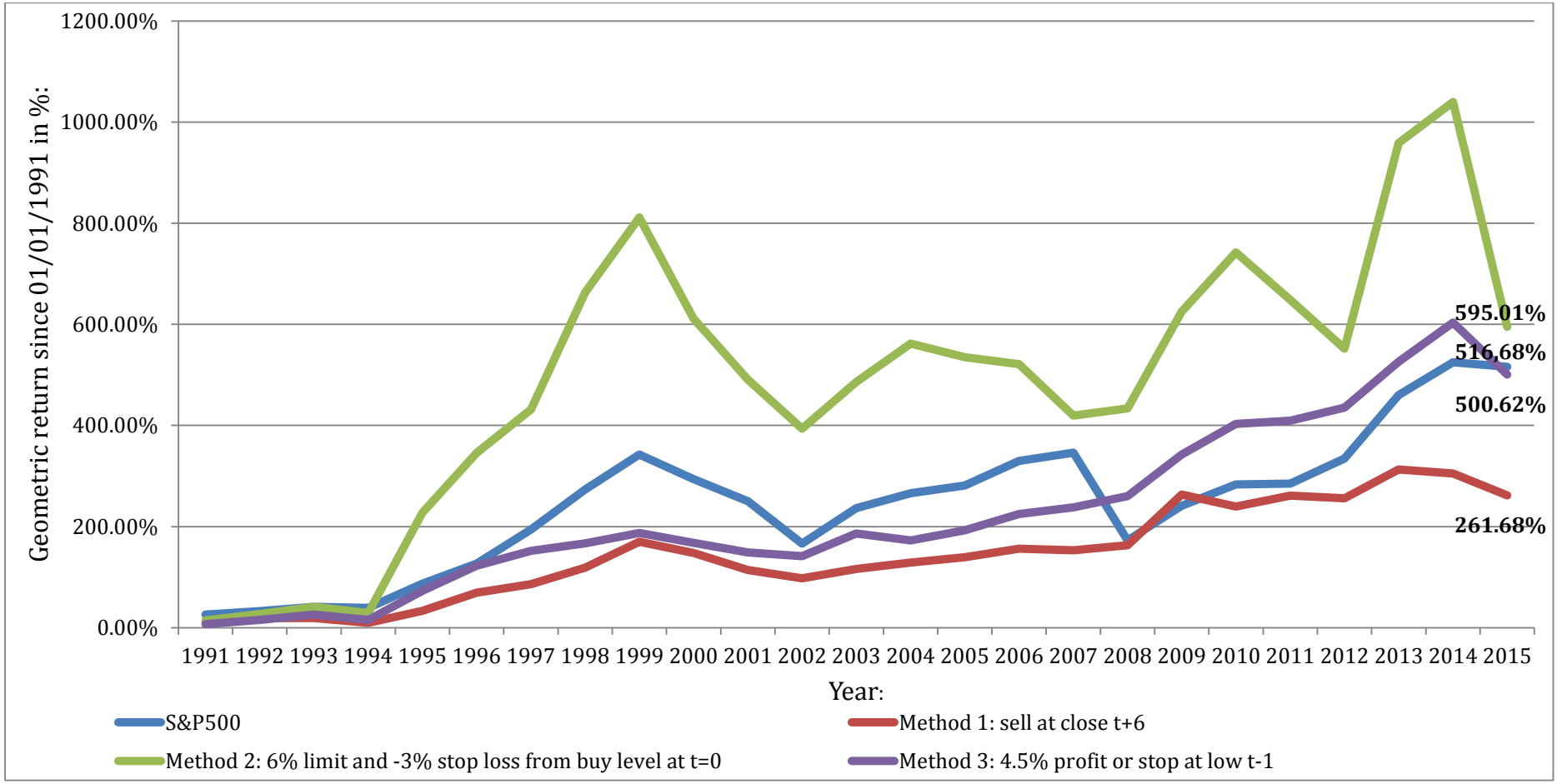


Figure 11: Best performing MOPOI buy and sell methods vs. S&P 500

5.4 MOPOI trading algorithm over major equity markets

5.4.1 MOPOI trading algorithm vs. DJIA

The MOPOI trading algorithm yielded a geometric return of 136.19% in the period of 01/01/1991 to 31/12/2015 vs. a geometric return of 5675.3% of the Dow Jones Industrial Average. The MOPOI trading algorithm, therewith, did not manage to outperform the Dow Jones Industrial Average over this period, as clearly illustrated by figure 12.

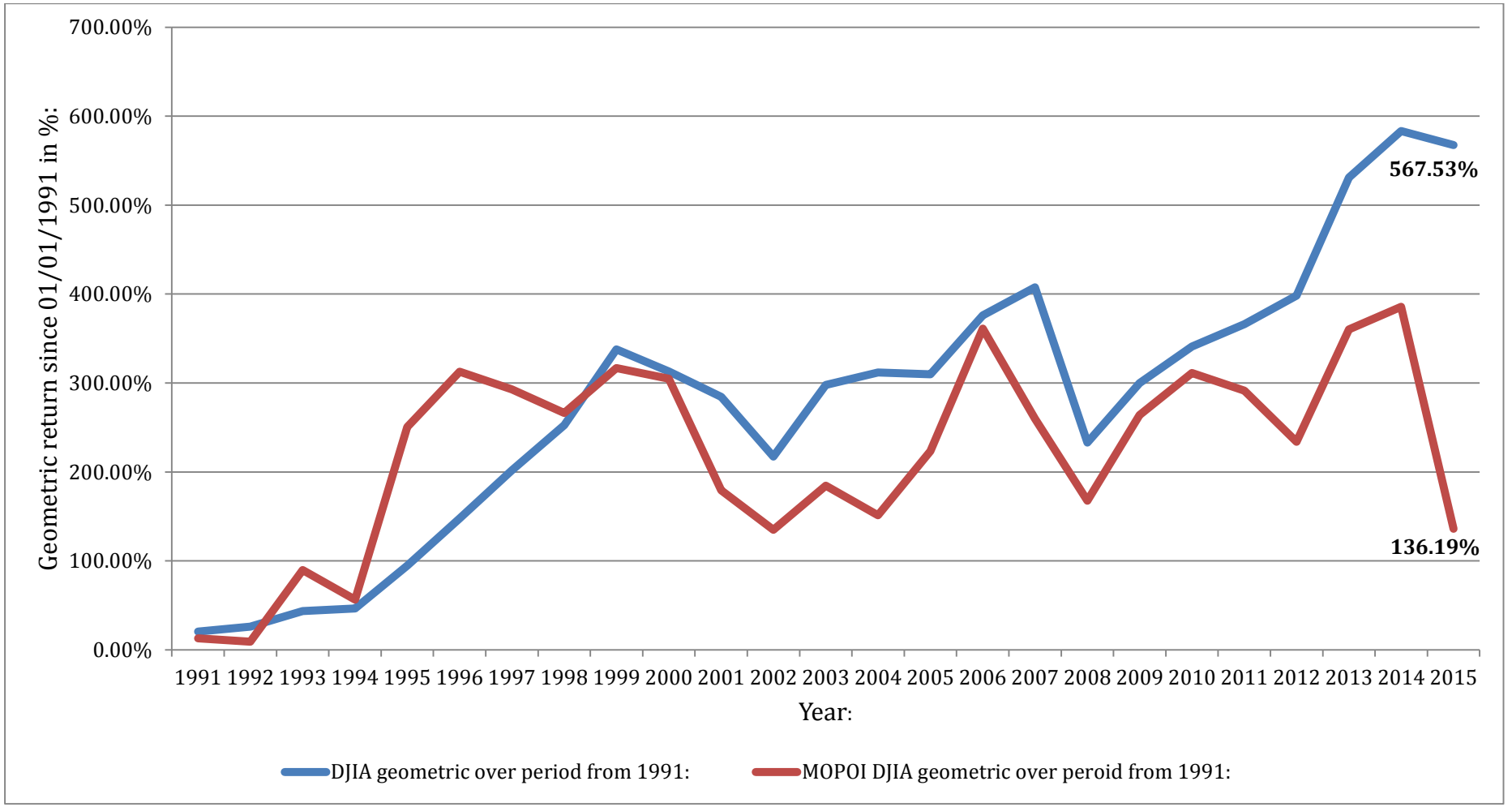


Figure 12: MOPOI trading algorithm vs. DJIA

5.4.2 MOPOI trading algorithm vs. FTSE 100

The MOPOI trading algorithm yielded a geometric return of 361.28% over the period 01/01/1991 to 31/12/2015, when applied on the FTSE 100. The FTSE 100 yielded a geometric return of 187.97% over the same period. The MOPOI trading algorithm, therewith, managed to outperform the FTSE 100 over this period, as illustrated by figure 13.

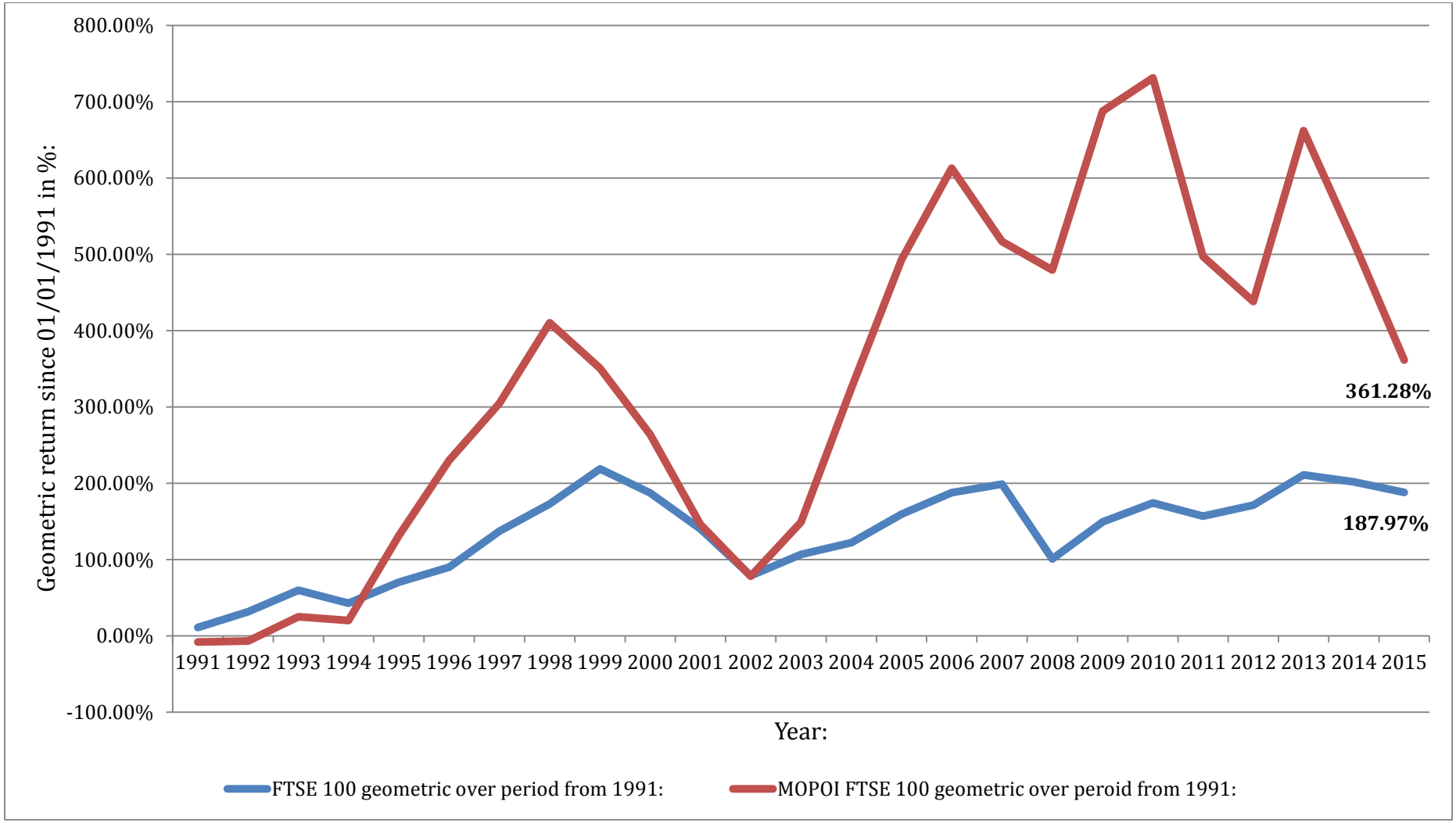


Figure 13: MOPOI trading algorithm vs. FTSE 100

5.4.3 MOPOI trading algorithm vs. DAX 30

The MOPOI trading algorithm yielded a geometric return of 1,527.43% over the period 01/01/1991 to 31/12/2015 vs. a geometric return of 675.67% over the same period by the DAX 30. The MOPOI trading algorithm, therewith, managed to outperform the DAX 30 over the same period, as illustrated by figure 14.

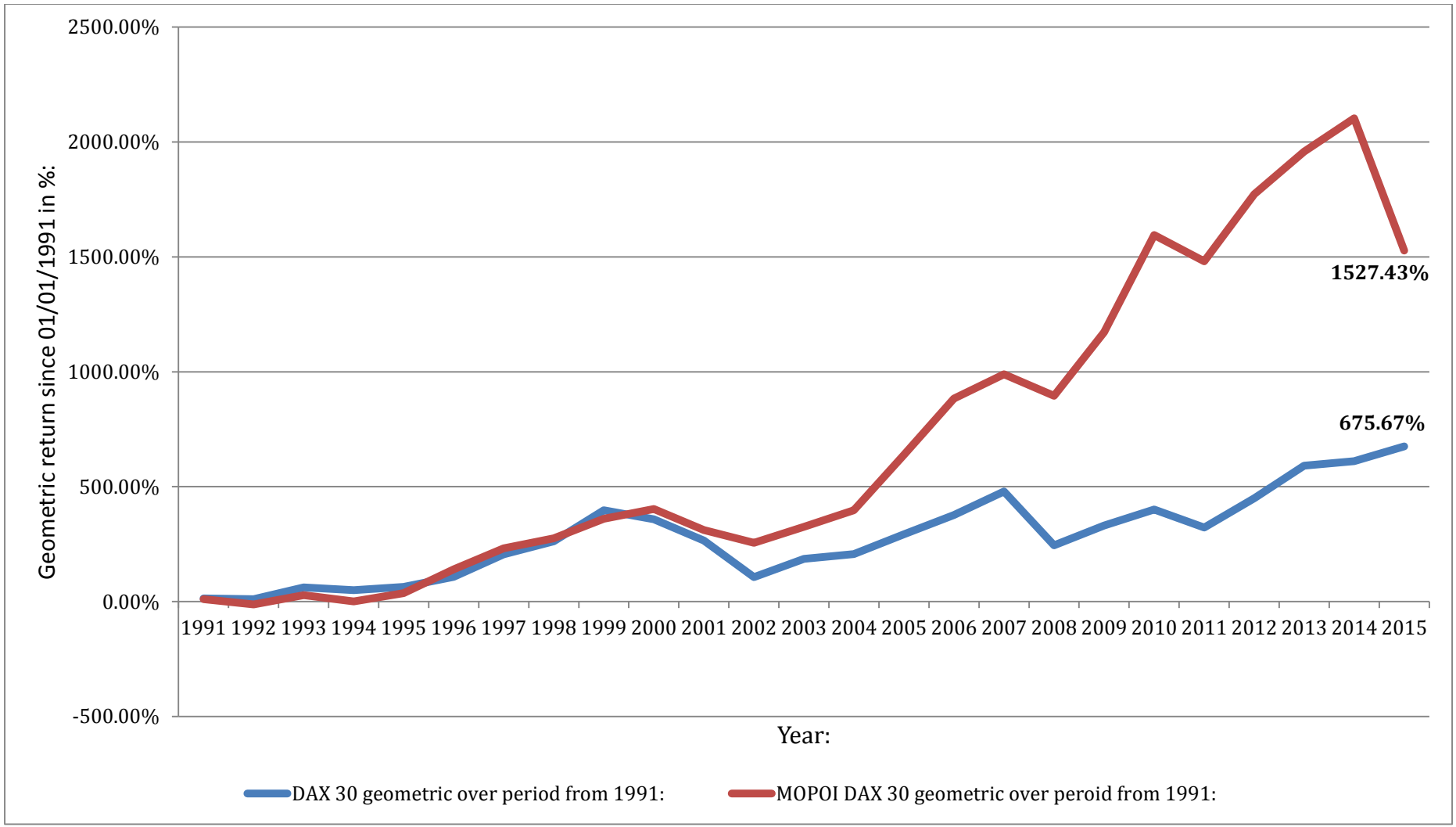


Figure 14: MOPOI trading algorithm vs. DAX 30

5.4.4 MOPOI trading algorithm vs. CAC 40

The MOPOI trading algorithm yielded a geometric return of 580.98% over the period 01/01/1991 to 31/12/2015 when employed on the CAC 40. The CAC 40 yielded a geometric return of 203.71% over the same period. The MOPOI algorithm, therefore, managed to outperform the CAC over the period of 01/01/1991 to 31/12/2015, as illustrated by figure 15.

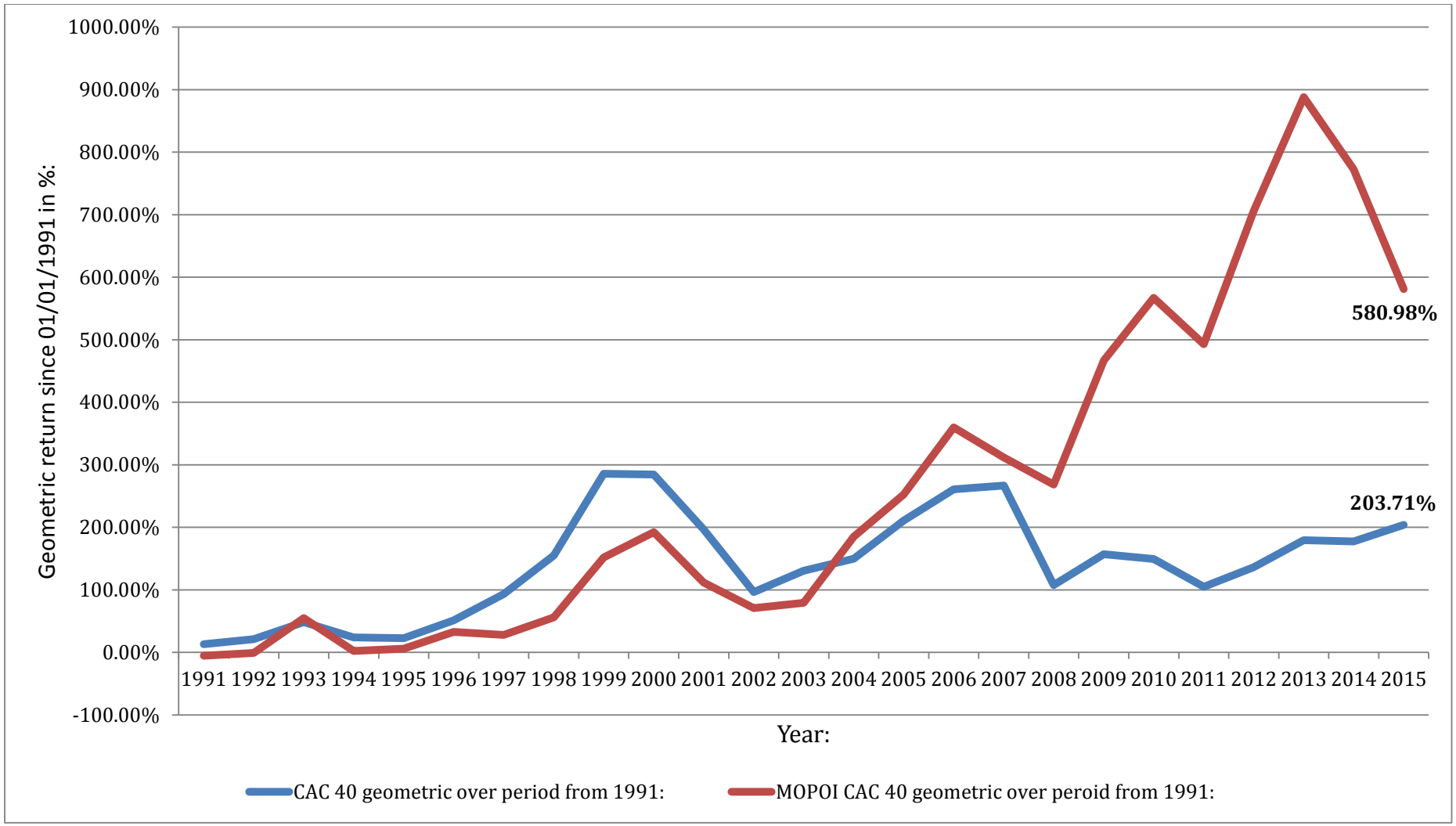


Figure 15: MOPOI trading algorithm vs. CAC 40

5.4.5 MOPOI trading algorithm vs. Hang Send Index

The MOPOI trading algorithm yielded a geometric return of 1,431.01% over the period 01/01/1991 to 31/12/2105 when employed on the Hang Seng Index. The Hang Seng Index returned a geometric return of 615.20% over the same time period. The MOPOI trading algorithm, therewith, managed to outperform the Hang Seng Index over the period of 01/01/1991 to 31/12/2015, as illustrated by figure 16.

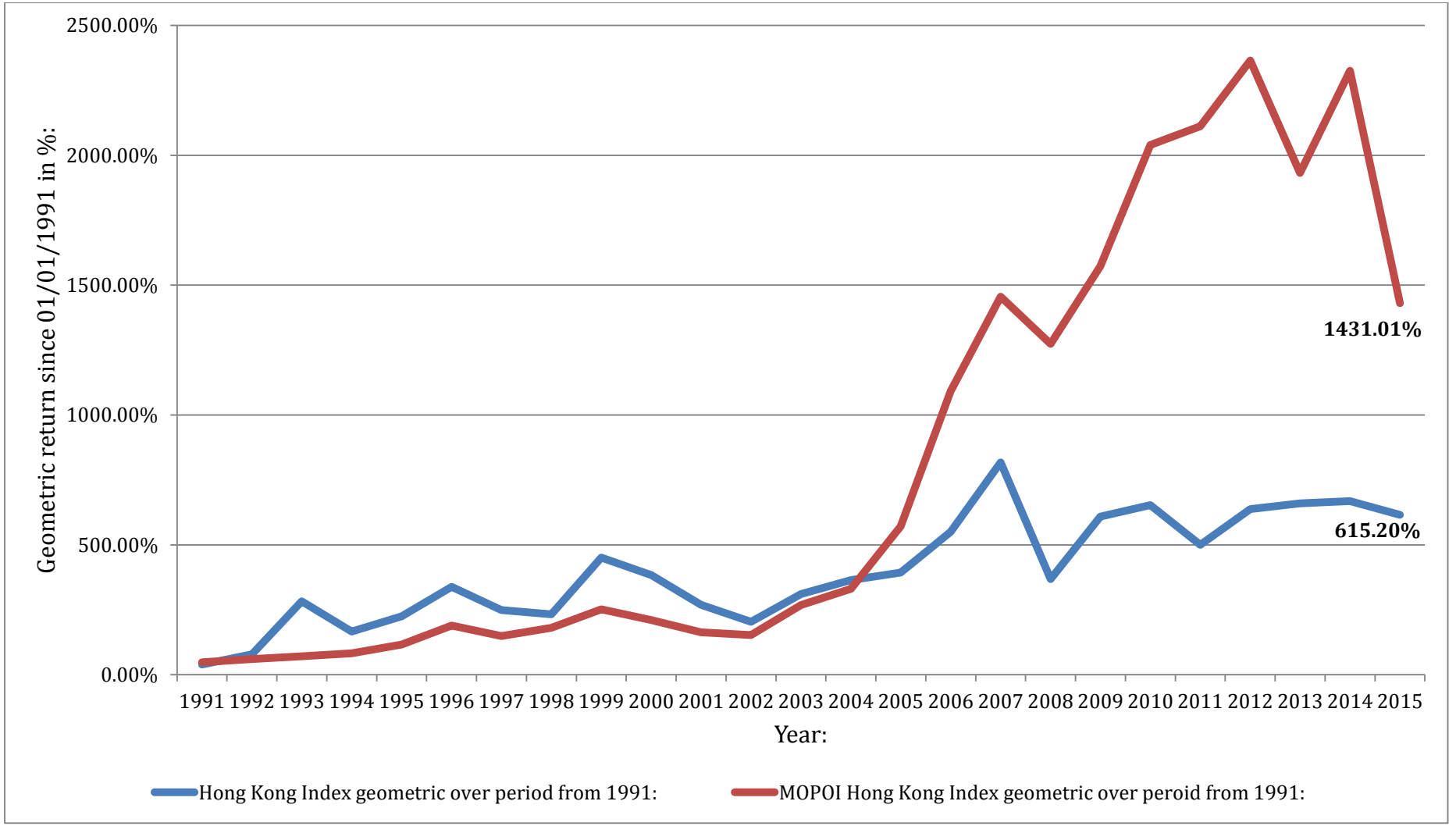


Figure 16: MOPOI trading algorithm vs. Hang Seng Index

6. Analysis of the results

6.1 Result analysis of variable y and variable z

A relation between the number of standard deviations and the summated returns found, can be identified. On average, a lower summated return is seen alongside a higher the number of standard deviation. This is reflected by figure 2 (chapter 5.1), where the combinations including 3.0 standard deviations are found at the bottom of the y-axis, while the combinations with a lower value for standard deviations are, on average, found higher up the y-axis. The combinations including 1.0 standard deviations returned, on average, the highest summated returns.

This underlying relationship can be caused by a number of reasons. The ranges of 2.4 to 3.0 standard deviations are not capable of generating summated positive returns that exceed 20% for any given year (as seen from table 4). The losses, however, for the range of 2.4 to 3.0 standard deviations do not return summated losses that exceed 20% either (as seen from table 5). A possible explanation as to why only profits smaller than 20% and losses smaller than 20% are reported within the range of 2.4 to 3.0 standard deviations could be the relatively low frequency of trades that the combinations with this range of standard deviations returns (as seen from table 6). The combinations including 2.4 to 3.0 standard deviation have on average 6.2 to 2.4 trades per year respectively. This frequency is lower than the frequency found for the combinations including 0.8 to 2.2 standard deviations, which have 14.8 to 7.6 trades on average per year respectively. The low frequency found for the combinations including 2.4 to 3.0 standard deviations may cause the inability for these combinations to generate profits and losses that exceed the 20% mark, and therewith fail to yield an overall higher summated return than the combinations with 0.8 to 2.2 standard deviations.

The combinations including 2.2 to 1.4 standard deviations were all capable of returning, and are the only combinations that returned, a summated return in excess of 30% profit within a one year time span (as seen from table 4). This range, however, also results in the highest losses found for an individual year (as seen from table 5). The range of 1.4 to 2.2 standard deviations managed to generate a higher frequency of entry signals than the combinations with 2.4 to 3.0 standard deviation, and is therefore capable of generating larger positive and negative summated returns than combinations with 2.4 to 3.0 standard deviations. However, the range of 1.4 to 2.2 standard deviations did, despite its ability to generate larger positive returns, not yield larger summated returns on a 15-year horizon than combinations including 0.8 to 1.2 standard deviations.

A possible explanation, as to why 0.8 to 1.2 standard deviations yield a higher summated return on a 15-year horizon, may be found in the losses that are being generated by the combinations with 1.4 to 2.2 standard deviations. For the combinations including 1.4 to 2.2 standard deviations the MOPOI levels are low enough to signal overreaction in moments in which the market sell offs. However, the MOPOI levels are high enough to signal an entry position at times when the market takes a moment to breath during a sell off. For the combinations including 0.8 to 1.2

standard deviations, the MOPOI values are lower, and the WVF values will thus have to decline more in order to generate a signal that signals an entry position. In moments of strong market sell-offs, such as in 2008, the combinations with 1.4 to 2.2 standard deviations, will generate more entry signals than combinations with 0.8 to 1.2 standard deviations. On average the MOPOI algorithm yields a higher summated return when a larger upward movement is seen in markets, then in markets in which large sell-offs take place, such as in 2008. The combinations including 0.8 to 1.2 trigger less often in markets which experience a sell-off, and are often more reliable in markets experiencing a sell-off than the triggers of combinations including 1.4 to 2.2 standard deviations. Several combinations including 0.8 and 1.0 standard deviations even returned a positive summated return for 2008, due to the low frequency and higher accuracy in markets with a long downward movement. This is ought to be the primary reason as to why 1.0 standard deviations is the most successful number of standard deviations found for the MOPOI algorithm. Appendix I, II and III provide more insight in the year-to-year returns for every tested combination of variable y and z.

SD:	Days – MA:	Year:	Summated profit (in %):
0.8	18	1998	27.85%
1.0	19	1998	26.85%
1.2	17	1998	26.91%
1.4	25	2009	34.05%
1.6	25	2009	33.94%
1.8	22	2009	33.08%
2.0	20	2009	33.27%
2.2	18	2009	31.72%
2.4	22 / 23 / 24	2009	18.90%
2.6	17	2009	9.56%
2.8	22	2009	9.35%
3.0	25	1995	5.13%

Table 4: Largest summated profits found for a year in the period 1991 – 2015 for 0.8-3.0 SD

SD:	Days – MA:	Year:	Summated loss (in %):
0.8	19	2001	9.03%
1.0	20	2002	25.82%
1.2	18	2002	35.05%
1.4	17	2008	42.11%
1.6	21	2008	51.16%
1.8	25	2008	48.28%
2.0	21	2008	30.55%
2.2	21	2008	24.14%
2.4	18	2008	18.69%
2.6	19	2008	18.75%
2.8	17 / 18 / 19	2008	10.77%
3.0	17 / 18	2008	4.09%

Table 5: Largest summated losses found for a year in the period 1991 – 2015 for 0.8-3.0 SD

SD:	Average frequency per combination for 1991-2015	Average frequency per combination per year
0.8	371	14.8
1.0	343	13.7
1.2	338	13.5
1.4	328	13.1
1.6	305	12.2
1.8	271	10.8
2.0	231	9.3
2.2	190	7.6
2.4	156	6.2
2.6	119	4.7
2.8	87	3.5
3.0	61	2.4

Table 6: Average frequency distribution for 0.8-3.0 SD

The number of days used for the moving average seems to have little influence on the summated return found for the MOPOI trading algorithm, before the inclusion of transaction costs. This is illustrated by the flat lines of standard deviations in figure 2 (chapter 5.1). The higher end of the tested range of the number of days, used to calculate the moving average, generates higher summated returns after the inclusion of transaction costs. This effect can be explained by the lower frequency of trades found for combinations with a higher number of days for the moving average, compared to combinations including a low number of days for the moving average (see appendix II for a year to year frequency of trades distribution for all combinations). Before transaction costs the higher frequency, of the lower spectrum of days to calculate the moving average, is offset by an increase of the accuracy when the moving average is calculated by the higher number of days for the moving average. This is a clear illustration of the equilibrium problem that has been described in chapter 4.1.1.

6.2 Result analysis of conditions

From the proposed conditions for the MOPOI algorithm, only the condition that demands the close of t-2 to be lower than the close of t-1 before entering a long position has been adopted. This condition comes from both condition two and three of this research, whereby the conditions are identical when only t-2 is compared with t-1.

Condition one appears to be an intuitive condition, that a small decline is not associated with an overreaction, and that overreactions can only be treated as an overreaction when the market has dropped a certain percentage point from the highest point within the last 22 trading days and the low of t-2. However, the highest summated return, of 108.85%, was found when a threshold level of 0.0-0.7 was included. This is the same return as when no condition is included. A possible explanation as to why a threshold level lowers the summated return is that the market is in a bullish trend for the last 22 trading days. When entering a long position during a bullish movement, the trade will, apparently, more often than not result in a positive

return. Despite the fact that such trades are not in line with the underlying philosophy of the MOPOI algorithm to trade reversals after a downward overreaction on the underlying asset, excluding these trades does decrease the summated return found for the MOPOI algorithm. Perhaps there is some truth in the saying "the trend is your friend".

The look back period for condition two seems to have little impact on the summated returns that have been found. A look back period whereby the close at t-2 of the underlying asset must be lower than the close at t-1 improves the summated return. The summated returns found while demanding the closes of t-3, t-4 and t-5 to be lower than the close at t-1 resulted in slightly lower summated returns. A possible explanation for this may be that a look back of the close of t-2 compared to t-1 already is sufficient to save-guard a confirmation of the reversal, whereby a longer look back period excludes more profitable than losing trades, and therewith results in a lower summated return.

The look back period for condition three whereby the close at t-2 of the underlying asset must be lower than the close at t-1 is identical to the same look back period of condition two. The longer look back periods stated in condition three, however, drastically decrease the summated return found. This likely hints that condition three demands for too strict confirmations when the look back period is set beyond t-2. The rules of condition three on the longer look back periods results in a given amount of good trades that are being excluded, which results in a lower summated return.

The results found in condition four state that allowing for multiple simultaneously open long position results in a higher summated return compared to restricting the number of open trades to one open long position at any given time. Given the fact that the MOPOI algorithm is capable of returning positive yields, this does make sense. On average profit is made on a trade, when nearly the same trade is made twice, then on average, a higher yield can be expected then when that same trade is only made once. The only problem with allowing for multiple simultaneously open long positions is that the beta of a portfolio which consists solely of trades executed by the MOPOI trading algorithm cannot be assumed to be equal or lower to that of the underlying asset, as a leverage effect of the underlying asset may, on average, carry the beta of the portfolio over a beta of one.

6.3 Result analysis of buy and sell methods

From the three tested buy and sell methods, the buy and sell strategy with which the long position was closed at a +6% limit, or a -3% stop loss from the level of the underlying asset at t+0, yielded the highest geometric return over the period 01/01/1991 to 31/12/2015 on the S&P500. While calculating the geometric return for the 97 proposed buy and sell strategies, noticeable differences were seen between the three methods, and the 97 buy and sell strategies.

Buy and sell method one yielded the lowest geometric return on the S&P500 over the tested period, compared to buy and sell method two and three. However, method one does appear to have a rather steady return per year, especially when selling at the close of t+0 to t+4 of the underlying asset (as seen from figure 8, chapter

5.3.1). The exception to this observation is found for the period 1999 to 2001, which is a time frame in which none of the buy and sells strategies managed to yield a positive geometric return. The semi-consistent return can be interpreted as a sign that the MOPOI algorithm is capable of correctly identifying reversal moments, subsequent to an overreaction on the underlying asset. None of the buy and sell strategies formulated under method one, however, managed to outperform the highest yielding buy and sell strategy under method two and three. The underperformance of buy and sell method one is likely to be attributed to the fact that the buy and sell strategies under method one were often not capable of capturing the full reversal, or the majority of the reversal, as there are plenty of moments in the period of 01/01/1991 to 31/12/2015 in which the reversal took more than seven days. Buy and sell method two and three are capable of capturing less steep and longer reversals, as they capture profits based on a percentage profit, rather than based on time. Furthermore, selling the long position at the close of a trading day can result in losses larger than those of the stop losses formulated under buy and sell method 1 & 2 (as seen from table 7, which state the highest recorded losses for a single trade for the buy and sell strategies under method one).

Close position at the close of:	Date:	Recorded loss (in %):
T+0	27-02-2009	6.88%
T+1	27-02-2009	8.66%
T+2	22-10-2008	9.25%
T+3	27-02-2009	9.56%
T+4	27-02-2009	11.24%
T+5	27-02-2009	9.25%
T+6	10-07-2002	14.11%

Table 7: Highest recorded losses from a single trade under method 1

Buy and sell method three is outperformed by the highest yielding buy and sell strategy from method two, despite the fact that both method two and method three take profits in the same manner, and have been tested in the same profit taking ranges. This shows that the sell method, with which losses are taken, under method two is more suitable for the MOPOI trading algorithm, than the sell strategy as formulated under method three. To sell at the lowest level of the underlying asset at t-1 is the highest geometric yielding sell strategy that has been found under method three. However, setting a stop loss at the low of the underlying asset at t-1 does lead to counterintuitive stop loss levels every so often, which are likely the key contributor as to why method three did not outperform method two. Although the stop loss for method three is often tighter than the stop loss of -3% of method two, and thus generates a lower loss per trade when the trade results in a loss, a stop loss level that is tight is more likely to be stopped out. At some moments in the sample method three set stop loss levels at only one-hundredths of a percent away from the opening level, which does not generate a high loss, but usually does not allow the long position to turn profitable. Furthermore, when positions with such tight stop losses are stopped out they do produce transaction costs of 37.5 base points, which, despite the small

percentage loss, over time generates a substantial negative impact on the geometric return found for the buy an sell strategies formulated under method three. The stop losses, as set under method three, can also be set far away from the level at which a long position is entered. Within the sample there were several times at which the market ripped higher at the day before a long position was entered, causing the stop loss to be 8-10% lower than the entry level. These stop loss levels caused large losses in some occasions within the sample, which due to the limited number of trades per year have a large impact on the geometric return for that given year.

Although buy and sell method two yielded the highest geometric return, and outperformed the S&P500 over the tested period, it does not have the feel of a solid buy and sell strategy for the MOPOI trading algorithm. Method two is capable of generating profits faster than method one and three, as the accuracy is of a sufficient level to generate a decent number of profitable trades. Furthermore, the profitable trades return a higher percentage return, than is being lost at a bad trade. The stop loss of the identified sell strategy seems wide enough to allow the market to have small downward swings subsequent to entering a long position without the position being closed, while being tight enough to prevent major accumulated losses. However, there are market movements in which this buy and sell strategy is not capable of capitalize the reversal identification power of the MOPOI algorithm. The MOPOI algorithm, including condition two, returned a summated return of 2.70% on the S&P500 for the year 2015 (see appendix V for the year to year returns for all strategies under method two). The MOPOI trading algorithm, however, yielded a geometric return of -39.02% for the year 2015 (see appendix IX for the year to year returns for all strategies under method three). In 2015 the S&P traded mainly flat in a certain bandwidth, which was wide enough to trigger the stop loss of 3%, but not wide enough to trigger the limit of 6%, resulting in a negative geometric return for the year. Therefore, it cannot be concluded that method two is capable of capturing the reversals identified by the MOPOI algorithm to its full potential. Additional conditions, or a different buy and sell strategy (e.g. a trailing stop loss) could likely be identified upon further testing, which may result in higher geometric returns for the MOPOI trading algorithm.

6.4 Result analysis of MOPOI trading algorithm vs. equity markets

The geometric return of the MOPOI trading algorithm vs. the DJIA stands out compared to the geometric returns of the MOPOI trading algorithm vs. the CAC 40, DAX 30, DJIA, FTSE 100, the Hang Seng Index and the S&P 500. The DJIA is the only tested equity market that the MOPOI trading algorithm did not manage to outperform, before the equity market was corrected for dividends. During the calculation process of the geometric return of the MOPOI trading algorithm on the DJIA, it was noted that the sell strategy of a +6% limit, and -3% stop loss from the opening level at t+0 of the DJIA was often not able to capture its profits. There were many instances in which an open long position was carrying a profit close to 6%, but was not able to capture that profit as the DJIA levels declined before the profits were captured, and pushed the open long position in a loss of 3%. This could mean that the trading strategy that has been identified on the S&P500 is not efficient when

employing the MOPOI trading algorithm on the DJIA. This may be caused by a difference in volatility between the S&P500 and the DJIA.

Another interesting observation that can be made from the geometric returns of the MOPOI trading algorithm vs. the tested equity markets, is that for the CAC 40, DAX 30, FTSE 100 and the Hang Seng Index the MOPOI trading algorithm started to outperform the underlying assets from the period of 2001 to 2003, rather than from the very start of the tested period, namely 1991. While discussing this matter with a debt capital market originator at ING it was pointed out that prior to 2000 the response time of investors was much slower than after that period, mainly due to digitalization that allows information to reach investors faster, and allows the traders to respond quicker to new information. As the reversal has been tested on a 4-day basis, the reversals are short, and require a much faster absorption rate of information, and response rate from investors, than when De Bond and Thaler tested the overreaction hypothesis over a three-year formation period in 1985.

7. Conclusion

This master thesis has been written in order to develop an algorithm that outperforms, or shows potential to outperform, financial markets that are ought to be weak form efficient. Parameters needed to be identified in order to test the MOPOI algorithm. For the period 01/01/1991 to 31/12/2015 the MOPOI algorithm returned, with 120.08%, the highest summated return with the parameters 1.0 standard deviations, 18 days for the moving average, and a condition which demands the close of t-2 to be lower than the close of t-1 before entering a long position. The highest geometric return was found for the MOPOI trading algorithm for the same period on the S&P500 by setting a long position at a +6% limit and a stop loss at -3% from the opening level of the long position. The MOPOI trading algorithm, with these parameters, returned the following geometric returns over the period 01/01/1991 to 31/12/2015, while including two way transaction costs of 37.5 base points:

	Geometric return underlying equity market	Geometric return MOPOI trading algorithm	MOPOI trading algorithm / equity market -100%
CAC 40:	203.71%	580.98%	185.20%
DAX 30:	675.67%	1,527.43%	126.06%
DJIA:	567.53%	136.19%	-76.00%
FTSE 100:	187.97%	361.28%	92.20%
Hang Seng Index:	615.20%	1,431.01%	132.61%
S&P 500:	516.68%	595.01%	15.16%

Table 8: Overview geometric returns

The MOPOI algorithm is able to outperform all tested equity markets, with the exception of the DJIA. A possible explanation as to why the MOPOI trading algorithm is not capable of outperforming the DJIA may be found in the difference of the volatility between the DJIA and the S&P500. The buy and sell strategy of the MOPOI trading strategy has been selected based on the S&P500 and may, due to the difference in volatility, not be compatible with the DJIA. The MOPOI trading algorithm does shows potential to be a trading algorithm that is capable of systematically outperforming financial markets that are ought to be weak form efficient by literature, as the MOPOI trading algorithm outperform the CAC40, DAX30, FTSE100, Hang Send Index and the S&P500 in this research.

The aforementioned results, however, do not provide statistical evidence against the weak form efficiency. As the beta is unknown for a portfolio which consist solely out of trades generated by the MOPOI trading algorithm, it is not possible to verify whether the MOPOI trading algorithm is capable of outperforming the underlying assets on a risk adjusted basis. Determining the beta of such a portfolio, and performing a statistical test to test the weak form efficiency with the MOPOI, is reserved for a follow up research. Furthermore, the equity markets have not been corrected for dividends, which results in a distorted view of the ability of the MOPOI trading algorithm to generate geometric returns vs. the underlying asset. The Hang

Seng Index used in this research is an exception to the list, as for the Hang Seng Index, as used in this paper, dividends are excluded in the calculation of the index. The other markets must be corrected in a follow up research, before the weak form efficiency can be tested with the MOPOI trading algorithm for these markets.

Aside from the unknown beta, and a comparison with mainly non-dividend corrected markets, there are other aspects that brought forward limitations to this research. While determining variable x, variable y and the conditions, a summated return was calculated based off of a return of four trading days. Four trading days was selected without empirical evidence that suggested that four days is the expected length of reversals for charts with a daily interval. Another limitation for this research is the fact that this research did not adjust the parameters of the algorithm and the buy and sell strategy for every underlying asset. As seen with the inability of the MOPOI trading algorithm to outperform the DJIA, it is evident that the MOPOI trading algorithm is not a "one size fits all" type of algorithm, and should be adjusted based on the volatility of each underlying asset. These are the main limitations within this research, which have not been addressed due to time restraints. Furthermore, the number of combinations between variable y, variable z, the conditions, and the buy and sell strategies have been greatly limited by dividing the methodology to identify these values in three parts. This choice has been made to save time, but may have resulted in a less efficient combination of variable y, variable z, the conditions, and the buy and sell strategy for the MOPOI trading strategy.

The aim of this paper, to develop an algorithm that shows potential to systematically outperform weak form efficient markets, has been fulfilled successfully. The MOPOI trading algorithm may not have outperformed all of the tested equity markets, but did manage to outperform the majority of the tested equity markets. Furthermore, the aforementioned limitations are an indication that the results found for the MOPOI trading algorithm likely have room for improvement upon further research. Therefore, the MOPOI trading strategy is deemed to hold potential to be further developed into an algorithm with which the weak form can be tested, and even possibly be disproved by future research. Follow up papers to further develop the MOPOI trading algorithm, calculate the beta, and with which statistical tests are performed in order to test the weak form efficiency with the MOPOI trading algorithm are highly recommended.

8. Limitations & future research

This paper did not perform a direct test to the weak form of the efficient market hypothesis, but the geometric returns found for the MOPOI trading algorithm on the S&P500, DAX 30, FTSE 100, CAC 40 and Hang Seng Index, do show results that seem to be in conflict with the weak form efficiency. There are several aspects that were not tested within this research that may improve the MOPOI trading algorithm. These aspects are mentioned in chapter 8.1. Furthermore, there are several factors that were not taken into account, which may provide a distorted view upon the geometric return of the MOPOI trading algorithm vs. the underlying equity markets. These factors must also be addressed in future research before the MOPOI trading algorithm can used to test the weak form efficiency. These factors have been stated in chapter 8.2.

8.1 Further testing to improve the MOPOI trading algorithm

Within this master thesis several choices have been made to reduce the workload. Due to these choices some ranges of parameters, trading strategies, etc. have not been investigated. It is therefore very likely that further testing may result in a more efficient MOPOI trading algorithm in terms of yielding higher geometric returns over a time period of multiple years.

Four day reversal testing: when seeking variable y and variable z, as well as seeking the conditions, a reversal of four days has been used to see whether the MOPOI algorithm captures the reversal of the directional effect. The selection of four trading days has been done in a highly arbitrary manner, and testing for reversals on a shorter and longer range may result in different parameters, which in turn may lead to a higher geometric return for the MOPOI algorithm.

Limited buy and sell strategies tested: in this master thesis only three buy and sell methods were tested. Initially the idea for testing with a trailing stop loss was scheduled for this master thesis. This was, however, not possible as no intraday data was available via Tradingview.com for the majority of the covered time period. A trailing stop method may yield higher geometrical returns, as it is capable of capturing larger returns in times of a continuous upward market. Additionally, a trailing stop loss method may include fewer and/or smaller losses, due to the fact that the level for the stop loss of a trailing stop loss is increased as the market reaches higher levels. Aside from the trailing stop loss, there may also be other buy and sell methods that were not tested in this master thesis that may yield higher geometrical returns for the MOPOI trading algorithm.

As seen in this master thesis, there are years (e.g. 2015) in which the buy and sell strategy results in a loss, while it appears that reversals were identified with positive summated returns for the same period while seeking variable y, variable z, and the conditions. This is a sign that the buy and sell strategy is likely not optimized yet. Further exploration and testing of buy and sell strategies for the MOPOI trading algorithm will likely result in the formulation of buy and sell strategies that yield a higher geometric return for the MOPOI trading algorithm.

Scaling the size of positions: in the literature evidence for the magnitude effect can be found *(Fung, Lam, & Wong, 2010; Fung, Lam, & Wong, 2013)*. The magnitude effect could be further incorporated in the MOPOI trading algorithm by scaling the size of the position that is opened to the WVF values at t-2. When the magnitude effect exists, and the MOPOI trading algorithm succeeds in capturing and trading the reversals, then there is a fair possibility that scaling the size of the position to the WVF values at t-2 will increase the geometric return found for the MOPOI trading algorithm.

Intervals: on average the MOPOI trading algorithm signalled an entry ±14.5 times a year. More trades per year can be expected by changing the interval of the chart from one day per candle, to a more frequent interval e.g 4-hour, 1-hour, 30-minutes, 15-minutes etc. The more frequent the interval, the lower the WVF values will be on average. The WVF values will be lower due to the difference between the highest point over the last 22 days and the current low (there usually is a larger difference between the high of the last 22 trading days and todays low, and the highest level over the last 22 minutes and this minutes low). For this reason variable y, variable z, the conditions, as well as a buy and sell strategy need to be re-evaluated, in order to find which parameters and buy and sell strategy suits a specific interval best. A higher frequency in trades, though, could greatly influence the geometric return for the MOPOI trading algorithm, and may thus be worthwhile to investigate.

Optimization on a variety of asset classes: the MOPOI trading algorithm may work on other asset classes, other than equity markets. The underlying reasoning for this is that the MOPOI trading algorithm is based on the overreaction hypothesis. Investors overreact as they put too much emphasis on recent news (De Bond & Thaler, 1985). There is no reason to assume that investors do not do so for individual stocks, commodities, etc. It may therefore be worthwhile to test and further develop the MOPOI trading algorithm on other asset classes. When employing the MOPOI trading algorithm on other asset classes, it is good to keep in mind that the volatility is different for each underlying asset. Therefore, re-evaluating the parameters and buy and sell strategies for each underlying asset may result in a higher geometric return for that specific underlying asset.

Additional conditions: as seen from figure 12 to 16, the MOPOI trading algorithm has several years in which it generates geometric losses for that year. Formulating additional conditions to prevent such losses, or reduce them, may enhance the geometric return of the MOPOI trading algorithm. 2015 is a particularly bad year for the MOPOI trading algorithm, while the underlying assets, generally, trade flat or gain a little. This is due to the combination of a sideways trading market with enough volatility to trigger the MOPOI trading strategy. The range of the sideways movement of the market in 2015, contained a prolonged period in which the trading range of the underlying asset was too narrow to generate a profit of 6%, while wide enough to generate a loss of 3%. By adding a condition that demands for a long-term upward movement of the underlying asset, the problem that is being encountered with a sideways market may be improved.

8.2 Distortions to the MOPOI trading algorithm

There are several aspects that have not been taken into account, or have not been calculated in this paper, which need to be calculated or which need to be taken into account in order to test the weak form efficiency with the MOPOI trading algorithm. Furthermore, a distorted view of the geometric return of the MOPOI trading strategy vs. the tested equity markets is presented due to several aspects not being taken into account in this paper. These aspects are the following:

Portfolio beta and statistical significance: in order to provide empirical evidence that supports or contradicts the weak form of the efficient market hypothesis, a statistical test needs to be performed in order to see whether the differences between the geometrical return found for the MOPOI trading algorithm and the underlying equity market are statistically significant. Such a statistical test has not been performed in this paper, as the beta of a portfolio trading based on the MOPOI trading algorithm is unknown. The weak form efficiency is argued to hold on a risk adjusted basis (Burton, 2003; Fama, 1970). Multiple simultaneously opened positions are allowed to be opened for the MOPOI trading algorithm within this paper. By allowing for simultaneously opened positions, the beta of a portfolio trading based on the MOPOI trading algorithm could potentially be larger than one over the tested period. With the beta for a portfolio trading based on the MOPOI trading algorithm being unknown, and with the knowledge that it may exceed a beta of one, no valid empirical evidence against the weak form efficiency can be provided based on a statistical test between the difference of the geometrical return of the MOPOI trading algorithm and the underlying equity market.

Correcting equity markets geometric returns: in this research the underlying equity markets were not corrected for dividend. The Hang Seng Index used in this research is an equity ticker for which dividend returns are excluded in the index calculations. Therefore, the geometric return of the MOPOI vs. the Hang Seng Index is likely a fair representation of the geometric returning power vs. the geometric return yielding power of the Hang Seng Index. For the CAC 40, DAX 30, DJIA, FTSE 100 and the S&P 500, however, the geometric return of the equity market should be stated as a higher geometric return, as dividends were not included in the returns of these equity markets. In order to test the weak form efficiency in future research, the underlying asset for which the weak form efficiency is tested, has to be corrected for dividends.

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Glossary:

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Appendix I: Year by year summated returns variable y and variable z, excluding transaction costs

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0.8	18	9.71%	8.17%	0.06%	2.21%	20.46%	19.28%	4.15%	27.85%	19.57%	0.35%	-5.17%	-8.06%	11.91%
0.8	19	9.34%	6.71%	0.70%	2.15%	20.06%	19.89%	5.16%	23.32%	21.48%	-2.89%	-9.03%	-6.34%	11.88%
1.0	17	12.22%	10.74%	5.15%	-1.06%	22.16%	16.21%	3.59%	21.42%	21.18%	14.80%	-3.63%	-23.87%	12.47%
1.0	18	14.82%	9.43%	7.49%	-2.25%	21.95%	13.72%	3.19%	24.96%	21.72%	13.08%	-1.38%	-22.53%	13.56%
1.0	19	15.22%	9.96%	6.82%	1.37%	21.80%	9.49%	3.96%	26.85%	22.47%	11.53%	-5.29%	-16.13%	12.77%
1.0	20	12.14%	9.54%	4.66%	5.00%	20.72%	10.37%	0.82%	26.48%	24.25%	6.11%	-7.21%	-25.82%	12.74%
1.0	21	12.20%	7.54%	3.10%	2.59%	19.25%	10.58%	3.49%	22.08%	24.67%	4.39%	-9.56%	-11.32%	10.58%
1.0	22	10.53%	7.22%	3.55%	4.92%	19.12%	12.51%	-2.71%	19.03%	22.02%	-2.00%	-4.45%	-12.56%	9.88%
1.0	23	9.86%	7.04%	2.62%	2.16%	16.65%	18.37%	-0.21%	17.95%	18.85%	0.86%	-4.42%	-14.84%	9.76%
1.0	24	9.84%	7.50%	2.59%	3.49%	18.10%	14.80%	-0.65%	17.88%	18.83%	1.29%	-2.74%	-13.37%	13.59%
1.0	25	11.34%	7.26%	2.18%	3.12%	17.34%	13.75%	0.48%	16.23%	17.80%	1.77%	-3.11%	-11.24%	15.77%
1.2	17	14.92%	8.72%	8.37%	-5.81%	19.87%	17.65%	-0.04%	26.91%	17.63%	12.98%	-2.99%	-35.05%	14.14%
1.2	18	15.10%	7.13%	4.88%	-4.55%	20.90%	15.23%	-0.73%	23.88%	18.94%	11.38%	-5.73%	-34.07%	14.09%
1.2	19	15.39%	7.79%	5.74%	-1.55%	20.22%	12.46%	0.21%	25.11%	18.95%	5.81%	-6.30%	-32.39%	14.11%
1.2	20	15.15%	7.79%	4.64%	-2.46%	18.85%	12.46%	-3.84%	15.79%	23.78%	11.49%	-1.24%	-30.75%	14.14%
1.2	21	15.10%	10.84%	4.64%	-4.88%	18.67%	9.05%	-4.65%	14.32%	21.71%	9.53%	-1.38%	-19.96%	14.11%
1.2	22	16.05%	10.84%	5.50%	-5.72%	18.22%	7.23%	-7.29%	14.27%	21.63%	12.05%	-1.42%	-19.96%	14.17%
1.2	23	15.58%	10.06%	6.27%	-4.94%	18.38%	9.62%	-7.33%	15.62%	22.72%	12.05%	2.09%	-19.75%	13.58%
1.2	24	15.58%	10.71%	6.29%	-1.59%	18.38%	10.38%	-8.06%	18.68%	20.38%	12.74%	1.04%	-18.30%	12.77%
1.2	25	13.14%	10.71%	4.72%	-0.71%	18.40%	10.43%	-7.02%	17.93%	20.38%	11.86%	1.04%	-18.20%	12.70%
1.4	17	16.09%	10.80%	7.20%	-3.75%	16.08%	13.88%	0.21%	22.04%	12.10%	13.87%	-6.96%	-28.97%	11.62%
1.4	18	15.06%	11.01%	9.03%	-3.83%	17.62%	9.64%	2.44%	20.21%	12.99%	11.97%	-10.84%	-40.03%	11.67%
1.4	19	14.74%	10.68%	7.00%	-3.78%	18.82%	11.16%	1.35%	18.06%	16.42%	16.49%	-10.72%	-39.13%	12.20%
1.4	20	14.94%	10.24%	6.33%	-6.98%	18.77%	10.74%	-1.15%	12.70%	16.48%	16.49%	-5.83%	-39.74%	15.47%

Table 9: Year by year summated return variable y and variable z, excluding transaction costs

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
0.8	18	9.39%	7.17%	3.73%	4.31%	1.52%	17.16%	16.25%	11.17%	9.67%	11.36%	15.30%	7.24%	**224.76%**
0.8	19	6.19%	6.79%	6.35%	4.42%	-4.82%	14.10%	15.58%	9.17%	12.71%	10.08%	14.47%	6.02%	**203.49%**
1.0	17	7.71%	6.71%	6.40%	2.56%	-19.27%	17.74%	10.48%	14.17%	13.20%	9.26%	15.63%	3.18%	**199.15%**
1.0	18	10.97%	5.22%	8.04%	8.83%	0.85%	20.01%	10.48%	12.77%	15.03%	15.82%	11.94%	9.06%	**246.78%**
1.0	19	10.98%	5.24%	5.14%	8.82%	0.65%	15.69%	3.96%	12.56%	14.99%	15.76%	12.95%	6.92%	**234.48%**
1.0	20	11.65%	5.15%	2.03%	6.93%	2.03%	18.45%	4.96%	10.19%	12.19%	13.14%	13.26%	5.94%	**205.72%**
1.0	21	9.51%	5.34%	3.75%	7.10%	2.12%	20.17%	12.55%	14.11%	12.69%	12.20%	11.42%	7.49%	**218.04%**
1.0	22	12.01%	5.17%	2.71%	4.79%	1.87%	17.61%	15.86%	12.59%	11.26%	11.88%	13.51%	7.14%	**203.46%**
1.0	23	13.83%	7.04%	2.25%	6.20%	-11.57%	15.89%	17.78%	11.94%	14.00%	10.23%	11.66%	8.44%	**192.34%**
1.0	24	10.60%	6.58%	5.38%	2.70%	-8.39%	13.82%	15.06%	14.85%	14.16%	9.78%	11.71%	6.00%	**193.40%**
1.0	25	8.71%	7.96%	5.36%	1.24%	-2.92%	10.96%	15.38%	12.17%	10.48%	10.96%	11.64%	6.40%	**191.03%**
1.2	17	9.25%	6.57%	9.54%	6.33%	-24.81%	17.04%	6.27%	15.71%	15.43%	11.98%	12.32%	6.18%	**189.11%**
1.2	18	9.22%	5.60%	6.71%	4.18%	-27.44%	14.82%	3.55%	14.31%	17.21%	11.23%	11.99%	6.28%	**164.11%**
1.2	19	9.24%	5.34%	6.35%	5.18%	-15.20%	14.82%	13.14%	13.92%	15.34%	13.60%	14.14%	8.19%	**189.61%**
1.2	20	10.20%	5.36%	6.39%	3.59%	-19.84%	13.24%	12.97%	16.68%	11.42%	12.38%	12.22%	8.90%	**179.31%**
1.2	21	10.20%	7.04%	5.72%	1.46%	-14.10%	19.96%	2.26%	14.96%	13.86%	12.09%	11.77%	8.77%	**181.09%**
1.2	22	13.52%	4.54%	7.39%	4.89%	-18.24%	19.96%	6.17%	15.62%	13.62%	11.11%	10.84%	11.16%	**186.15%**
1.2	23	13.79%	4.74%	5.81%	6.12%	-5.45%	20.32%	1.08%	15.32%	13.62%	12.35%	10.32%	11.16%	**203.13%**
1.2	24	11.30%	4.76%	5.81%	3.28%	-2.83%	20.32%	-0.51%	11.74%	11.14%	12.35%	10.32%	9.81%	**196.49%**
1.2	25	11.30%	5.58%	2.70%	2.71%	-9.48%	19.29%	-0.37%	15.18%	10.83%	12.25%	10.01%	8.89%	**184.27%**
1.4	17	9.37%	5.24%	11.45%	2.86%	-42.11%	20.09%	8.58%	21.12%	15.15%	8.31%	12.52%	4.23%	**161.02%**
1.4	18	6.15%	5.44%	10.99%	2.41%	-37.24%	17.58%	2.63%	20.27%	14.98%	11.67%	12.61%	4.03%	**138.46%**
1.4	19	6.93%	6.43%	10.99%	0.73%	-37.03%	16.41%	-3.84%	20.30%	14.64%	11.64%	10.20%	5.93%	**136.62%**
1.4	20	7.91%	6.59%	10.99%	3.72%	-36.02%	15.55%	-0.91%	15.52%	17.41%	10.12%	11.88%	6.92%	**138.14%**

Table 10: Year by year summated return variable y and variable z, excluding transaction costs (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1.4	21	14.94%	8.92%	8.63%	-7.31%	19.17%	10.33%	-4.24%	16.52%	16.48%	14.22%	-5.61%	-39.46%	10.91%
1.4	22	15.09%	9.30%	6.52%	-6.93%	18.38%	9.45%	-5.50%	15.97%	16.40%	14.22%	-3.09%	-32.21%	10.91%
1.4	23	15.04%	10.73%	6.38%	-5.63%	18.38%	11.34%	2.30%	12.52%	14.99%	8.72%	2.16%	-39.46%	10.41%
1.4	24	14.32%	10.14%	5.41%	-4.09%	17.20%	11.34%	1.13%	12.58%	13.09%	8.68%	3.99%	-29.72%	10.41%
1.4	25	14.95%	10.14%	5.41%	-5.01%	17.16%	11.43%	2.09%	12.54%	18.84%	11.70%	3.74%	-30.58%	10.41%
1.6	17	14.69%	9.21%	8.49%	-0.45%	14.50%	2.69%	1.45%	14.15%	12.25%	11.33%	-12.33%	-20.57%	14.43%
1.6	18	15.91%	9.23%	7.49%	-0.71%	13.92%	2.36%	1.47%	18.13%	14.39%	14.14%	-12.26%	-23.30%	14.24%
1.6	19	15.95%	9.46%	7.67%	-4.46%	15.37%	5.99%	-2.64%	10.29%	11.88%	16.59%	-6.33%	-23.63%	14.25%
1.6	20	16.04%	9.20%	7.13%	-4.37%	14.25%	4.84%	-5.94%	10.25%	11.82%	16.45%	-8.19%	-25.10%	14.28%
1.6	21	15.41%	11.33%	7.14%	-4.27%	13.46%	6.08%	-3.93%	10.56%	11.83%	13.66%	-8.14%	-26.44%	16.59%
1.6	22	14.26%	11.28%	7.11%	-4.94%	13.44%	6.67%	7.85%	7.27%	10.54%	19.17%	-4.39%	-25.19%	15.77%
1.6	23	14.94%	10.74%	6.73%	-6.42%	14.40%	7.00%	3.76%	7.15%	10.03%	16.95%	-4.47%	-25.07%	16.00%
1.6	24	14.88%	10.74%	6.56%	-7.27%	15.80%	9.94%	3.76%	7.18%	12.39%	16.93%	-4.94%	-35.15%	13.44%
1.6	25	14.85%	10.56%	6.16%	-7.28%	14.03%	8.83%	2.47%	7.79%	12.73%	13.26%	-3.44%	-35.68%	13.44%
1.8	17	14.73%	8.26%	8.65%	2.99%	12.05%	6.10%	2.97%	10.59%	12.29%	18.45%	-4.43%	-15.94%	15.58%
1.8	18	14.80%	7.17%	6.74%	0.40%	11.73%	6.87%	2.40%	2.78%	11.98%	19.42%	-3.38%	-15.00%	15.55%
1.8	19	14.19%	8.11%	6.94%	-1.61%	12.06%	2.77%	-0.81%	5.18%	11.04%	19.37%	-3.44%	-13.56%	15.53%
1.8	20	14.19%	7.53%	6.55%	-1.95%	12.72%	1.46%	-0.04%	7.15%	11.99%	16.74%	-5.30%	-14.92%	12.61%
1.8	21	14.23%	7.52%	6.57%	-0.79%	11.90%	2.43%	-0.81%	5.61%	12.00%	17.31%	-6.31%	-16.26%	13.02%
1.8	22	15.22%	7.82%	6.57%	-2.52%	12.11%	3.91%	3.29%	6.86%	11.76%	18.56%	-6.31%	-18.37%	13.05%
1.8	23	15.91%	7.79%	6.57%	-3.40%	12.07%	3.89%	3.34%	6.89%	12.10%	18.38%	-6.28%	-20.68%	13.04%
1.8	24	15.67%	6.39%	4.74%	-4.58%	12.11%	7.19%	3.32%	7.28%	12.16%	14.72%	-6.16%	-20.65%	12.88%
1.8	25	15.64%	6.70%	7.15%	-3.07%	10.31%	5.25%	3.63%	6.31%	16.24%	11.46%	-6.20%	-23.52%	12.09%
2.0	17	10.32%	6.91%	6.18%	3.61%	10.03%	2.82%	7.05%	2.76%	3.37%	11.88%	-5.34%	-14.36%	8.98%
2.0	18	13.95%	7.30%	5.90%	2.28%	11.00%	2.79%	5.41%	3.78%	4.26%	11.44%	-11.95%	-13.82%	7.74%

Table 11: Year by year summated return variable y and variable z, excluding transaction costs (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
1.4	21	11.11%	6.63%	8.10%	3.69%	-39.94%	24.52%	-6.71%	16.94%	19.21%	9.32%	11.16%	9.66%	**137.19%**
1.4	22	11.39%	6.63%	7.12%	6.02%	-34.86%	20.19%	-2.47%	16.94%	19.21%	9.76%	10.49%	9.11%	**148.04%**
1.4	23	11.43%	6.63%	6.64%	3.89%	-29.23%	20.34%	-1.17%	16.24%	16.92%	11.89%	9.94%	11.03%	**152.43%**
1.4	24	7.97%	6.18%	6.64%	3.19%	-29.79%	28.21%	6.38%	18.10%	14.65%	12.28%	12.62%	11.10%	**172.01%**
1.4	25	8.63%	6.22%	6.64%	1.13%	-27.02%	34.05%	2.47%	16.51%	8.84%	9.97%	11.45%	10.05%	**171.76%**
1.6	17	8.53%	4.11%	11.00%	3.81%	-35.86%	16.72%	-0.76%	17.87%	12.95%	8.72%	7.58%	-1.18%	**123.33%**
1.6	18	6.59%	4.28%	11.42%	2.55%	-35.89%	19.40%	-2.70%	17.12%	12.94%	10.35%	7.98%	3.54%	**132.59%**
1.6	19	5.79%	5.31%	11.42%	0.06%	-46.12%	20.74%	-3.74%	13.97%	12.50%	8.75%	13.03%	6.21%	**118.31%**
1.6	20	9.80%	6.24%	11.45%	-3.42%	-47.64%	25.94%	-3.27%	12.47%	12.55%	10.12%	11.18%	5.45%	**111.53%**
1.6	21	8.14%	6.20%	10.43%	1.09%	-51.07%	25.99%	-1.75%	12.49%	9.78%	10.98%	10.60%	5.90%	**112.06%**
1.6	22	8.60%	6.29%	11.60%	-0.13%	-51.16%	23.15%	-1.26%	11.83%	8.68%	10.21%	10.04%	6.50%	**123.19%**
1.6	23	5.02%	6.43%	11.63%	1.00%	-48.16%	31.00%	0.23%	10.99%	10.06%	10.21%	10.84%	8.14%	**129.13%**
1.6	24	5.68%	6.38%	11.16%	0.98%	-45.96%	30.97%	-4.47%	10.90%	9.55%	10.57%	10.86%	6.90%	**117.78%**
1.6	25	5.46%	2.53%	11.14%	1.81%	-44.13%	33.94%	-8.60%	12.84%	11.63%	9.65%	10.89%	7.37%	**112.25%**
1.8	17	2.07%	2.77%	11.78%	1.65%	-35.14%	21.09%	-1.46%	16.89%	5.92%	13.58%	10.12%	-1.98%	**139.58%**
1.8	18	2.07%	2.56%	10.99%	0.43%	-35.42%	30.68%	-2.88%	25.39%	7.07%	10.54%	9.40%	-1.07%	**141.22%**
1.8	19	5.18%	4.95%	10.99%	-0.98%	-34.69%	31.13%	-2.91%	21.92%	7.03%	10.54%	10.42%	-1.07%	**138.28%**
1.8	20	6.53%	4.92%	9.27%	-0.98%	-34.75%	33.08%	1.00%	21.59%	7.69%	12.41%	9.67%	-1.13%	**138.03%**
1.8	21	8.45%	4.80%	10.42%	-1.45%	-34.79%	33.04%	-2.37%	20.44%	4.93%	10.05%	5.87%	3.50%	**129.31%**
1.8	22	6.95%	5.72%	10.44%	1.49%	-34.86%	33.13%	-2.45%	20.48%	6.68%	9.17%	5.33%	3.51%	**137.54%**
1.8	23	5.18%	6.00%	10.90%	1.45%	-47.44%	29.85%	-2.40%	10.26%	8.70%	9.51%	8.06%	5.92%	**115.61%**
1.8	24	7.56%	5.73%	10.90%	-0.35%	-48.23%	29.68%	-0.43%	11.53%	7.13%	10.10%	10.79%	5.95%	**115.43%**
1.8	25	6.86%	6.58%	10.90%	-0.83%	-48.28%	29.73%	0.71%	11.46%	9.29%	10.49%	10.32%	5.00%	**114.22%**
2.0	17	-0.39%	-4.42%	8.14%	4.51%	-27.63%	30.28%	-2.33%	24.99%	3.19%	11.61%	8.85%	-2.74%	**108.27%**
2.0	18	0.08%	1.46%	8.51%	5.43%	-26.70%	31.35%	-3.52%	22.27%	5.46%	12.74%	9.07%	-2.71%	**113.52%**

Table 12: Year by year summated return variable y and variable z, excluding transaction costs (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.0	19	13.69%	7.47%	6.41%	2.28%	10.66%	5.92%	-0.56%	3.73%	7.08%	14.85%	-10.75%	-10.28%	8.69%
2.0	20	14.46%	6.90%	6.61%	1.51%	9.79%	6.10%	-1.38%	2.35%	9.42%	11.43%	0.19%	-6.75%	12.56%
2.0	21	14.12%	6.89%	6.82%	0.49%	9.87%	5.89%	-3.25%	2.89%	10.14%	11.59%	1.67%	-9.80%	11.11%
2.0	22	16.71%	6.92%	7.30%	0.11%	9.84%	5.83%	0.25%	3.60%	13.72%	11.58%	0.49%	-8.75%	11.05%
2.0	23	13.34%	5.67%	6.97%	-1.49%	8.78%	5.81%	3.33%	2.17%	14.86%	11.36%	0.49%	-5.06%	11.85%
2.0	24	13.33%	5.67%	7.05%	-1.51%	9.04%	5.83%	3.34%	3.77%	14.87%	11.23%	-6.50%	-4.60%	11.41%
2.0	25	12.00%	5.68%	5.67%	-0.57%	10.62%	6.38%	3.29%	2.40%	12.37%	14.82%	-6.50%	-9.49%	12.11%
2.2	17	9.99%	4.78%	8.03%	1.32%	8.76%	-1.06%	1.11%	3.04%	6.80%	9.15%	-13.98%	-1.70%	6.76%
2.2	18	10.34%	4.78%	8.03%	0.23%	8.78%	-1.26%	0.73%	1.19%	6.77%	9.15%	-14.33%	-1.63%	7.54%
2.2	19	10.31%	4.32%	6.85%	0.23%	7.36%	-0.16%	1.11%	1.24%	6.09%	8.92%	-9.32%	0.57%	8.99%
2.2	20	10.37%	5.64%	6.38%	0.19%	7.38%	1.15%	0.68%	1.40%	2.81%	11.85%	-9.32%	0.57%	8.34%
2.2	21	15.73%	5.64%	6.40%	0.89%	7.40%	2.26%	7.20%	2.44%	6.55%	11.85%	-9.27%	1.11%	8.28%
2.2	22	10.28%	4.19%	6.40%	1.16%	8.77%	1.15%	6.79%	2.43%	9.85%	11.80%	-9.32%	0.38%	8.34%
2.2	23	9.25%	4.76%	6.43%	2.63%	8.77%	6.44%	6.83%	3.34%	10.30%	11.63%	-9.27%	0.38%	12.50%
2.2	24	8.37%	4.78%	6.60%	2.63%	8.79%	6.45%	3.71%	2.45%	10.32%	9.76%	-7.81%	4.97%	5.67%
2.2	25	10.13%	4.78%	5.05%	1.95%	7.95%	6.42%	2.97%	0.72%	10.31%	11.51%	-7.89%	5.12%	9.55%
2.4	17	9.15%	3.20%	6.63%	-2.03%	7.30%	-3.18%	-2.89%	3.32%	0.71%	5.78%	-11.88%	0.43%	4.68%
2.4	18	8.84%	4.06%	6.63%	0.71%	8.13%	-2.97%	-2.49%	0.94%	3.60%	5.71%	-12.76%	0.93%	4.65%
2.4	19	8.71%	4.06%	6.63%	0.74%	7.31%	-2.39%	-1.65%	1.71%	3.56%	3.79%	-13.95%	0.47%	6.09%
2.4	20	8.70%	4.06%	8.00%	0.68%	7.28%	-2.74%	-1.64%	0.50%	3.57%	4.39%	-13.92%	0.99%	6.09%
2.4	21	6.94%	4.02%	8.00%	0.02%	7.39%	0.13%	3.73%	1.45%	6.22%	4.41%	-13.92%	1.16%	8.32%
2.4	22	5.10%	4.06%	8.00%	1.50%	7.37%	0.16%	5.29%	1.48%	6.22%	4.41%	-18.55%	1.16%	8.29%
2.4	23	5.10%	3.74%	6.37%	1.50%	5.92%	1.33%	5.24%	1.45%	3.23%	4.33%	-18.62%	0.97%	8.28%
2.4	24	5.10%	4.22%	5.04%	2.09%	5.03%	2.61%	5.51%	0.59%	4.76%	9.72%	-7.70%	1.05%	8.25%
2.4	25	5.27%	4.22%	5.06%	2.33%	5.86%	1.12%	7.25%	1.44%	7.74%	9.73%	-8.11%	1.15%	8.31%

Table 13: Year by year summated return variable y and variable z, excluding transaction costs (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
2.0	19	1.78%	0.89%	7.02%	3.75%	-27.17%	32.44%	-4.50%	21.98%	2.24%	14.02%	8.10%	-2.24%	**117.50%**
2.0	20	0.55%	3.71%	8.78%	1.92%	-30.40%	33.27%	-1.05%	21.98%	3.49%	12.60%	7.70%	-0.24%	**135.50%**
2.0	21	4.59%	3.15%	8.48%	0.43%	-30.55%	32.99%	-2.10%	19.96%	4.91%	10.84%	7.22%	0.52%	**128.87%**
2.0	22	2.16%	3.12%	7.60%	0.79%	-21.39%	29.50%	-2.56%	23.17%	6.32%	10.48%	9.85%	0.54%	**148.23%**
2.0	23	4.63%	5.75%	10.41%	-1.36%	-24.88%	25.36%	-2.55%	23.18%	6.29%	10.89%	9.86%	0.50%	**146.16%**
2.0	24	5.34%	4.87%	10.42%	-1.34%	-24.93%	28.85%	-2.18%	22.31%	8.54%	11.45%	9.88%	-0.21%	**145.93%**
2.0	25	6.39%	6.10%	10.47%	0.57%	-21.53%	28.80%	-2.40%	22.32%	8.50%	11.42%	9.66%	2.30%	**151.38%**
2.2	17	3.57%	-4.33%	2.09%	1.74%	-24.11%	18.92%	-4.72%	13.31%	3.68%	3.64%	4.94%	-1.05%	**60.68%**
2.2	18	-2.49%	-3.88%	2.08%	5.47%	-10.47%	31.72%	-5.04%	8.62%	4.78%	7.87%	4.43%	-1.12%	**82.29%**
2.2	19	-3.00%	-3.90%	2.12%	4.54%	-10.66%	27.56%	-3.10%	10.96%	5.05%	7.03%	3.38%	-1.12%	**85.37%**
2.2	20	-3.42%	-4.27%	4.59%	3.18%	-11.44%	24.10%	-2.03%	20.23%	5.86%	12.37%	6.87%	-0.03%	**103.45%**
2.2	21	-1.20%	-3.90%	5.16%	3.19%	-24.14%	20.86%	-2.78%	20.17%	3.50%	14.96%	8.03%	0.84%	**111.17%**
2.2	22	-1.24%	-0.68%	5.16%	4.94%	-20.09%	20.86%	-2.81%	20.32%	3.50%	14.37%	8.65%	1.30%	**116.50%**
2.2	23	-1.20%	-0.68%	6.37%	3.22%	-19.91%	18.81%	-3.22%	20.25%	1.28%	14.96%	9.46%	1.30%	**124.63%**
2.2	24	-0.24%	0.43%	6.33%	1.13%	-16.61%	18.81%	-2.48%	21.01%	3.86%	14.55%	8.95%	2.50%	**124.93%**
2.2	25	-0.24%	2.14%	6.29%	1.13%	-18.48%	17.77%	-2.53%	19.59%	5.47%	10.94%	8.98%	1.81%	**121.44%**
2.4	17	-0.31%	-1.46%	2.16%	2.68%	-15.80%	12.58%	3.25%	11.68%	2.51%	3.01%	5.30%	2.04%	**48.86%**
2.4	18	-1.60%	-1.13%	2.16%	2.66%	-18.69%	12.58%	1.43%	10.77%	3.04%	2.66%	2.96%	1.50%	**44.32%**
2.4	19	-1.60%	-3.72%	2.36%	2.66%	-18.65%	11.29%	1.51%	10.77%	3.05%	3.82%	4.84%	4.23%	**45.64%**
2.4	20	-0.75%	-3.72%	2.08%	3.07%	-17.18%	9.26%	1.41%	10.76%	2.12%	4.13%	4.33%	4.21%	**45.68%**
2.4	21	-3.23%	-3.73%	0.89%	4.26%	-15.16%	9.41%	-1.28%	10.80%	2.45%	8.08%	4.31%	2.44%	**57.11%**
2.4	22	-4.22%	-4.13%	0.90%	2.62%	-19.81%	18.90%	-3.16%	10.73%	2.88%	7.61%	3.49%	4.90%	**55.20%**
2.4	23	-4.24%	-3.48%	0.89%	3.49%	-11.08%	18.90%	-1.95%	10.73%	5.72%	10.54%	7.20%	2.60%	**68.16%**
2.4	24	-2.72%	-1.26%	2.47%	1.05%	-12.57%	18.90%	-2.90%	16.94%	5.70%	9.37%	7.04%	2.77%	**91.06%**
2.4	25	-2.68%	-1.26%	3.70%	3.20%	-12.45%	15.43%	-2.81%	15.51%	5.68%	9.45%	7.94%	3.23%	**96.31%**

Table 14: Year by year summated return variable y and variable z, excluding transaction costs (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.6	17	7.18%	0.76%	4.80%	-2.03%	5.73%	3.54%	-0.45%	2.07%	-0.87%	4.98%	-4.24%	9.26%	4.72%
2.6	18	5.27%	0.75%	5.95%	-2.77%	5.02%	-1.72%	-2.51%	-1.47%	-0.88%	5.26%	-6.89%	7.11%	6.11%
2.6	19	8.05%	5.04%	6.65%	-2.69%	6.49%	-1.56%	-2.88%	-2.85%	3.69%	5.26%	-9.25%	6.25%	6.08%
2.6	20	4.40%	5.04%	6.65%	-1.67%	6.49%	-1.56%	1.87%	0.93%	3.69%	5.26%	-11.86%	6.25%	6.08%
2.6	21	5.50%	5.04%	6.65%	-1.67%	6.49%	-1.78%	0.50%	0.93%	3.69%	5.32%	-8.05%	6.25%	6.08%
2.6	22	5.50%	5.04%	4.87%	-0.18%	6.49%	-0.96%	2.74%	1.73%	3.65%	5.26%	-12.80%	2.39%	6.08%
2.6	23	5.50%	3.18%	4.87%	-0.21%	5.03%	-0.96%	2.56%	-1.53%	3.62%	7.11%	-12.74%	0.99%	6.08%
2.6	24	5.50%	3.18%	4.87%	-0.21%	5.03%	-0.96%	2.60%	3.60%	3.62%	7.11%	-14.00%	1.02%	6.08%
2.6	25	3.86%	5.92%	6.65%	-0.21%	5.03%	-1.17%	3.45%	3.60%	3.62%	7.11%	-13.95%	0.94%	6.08%
2.8	17	1.57%	0.40%	1.60%	-2.48%	3.57%	-1.28%	-2.64%	1.49%	-0.46%	2.51%	0.84%	7.09%	-1.39%
2.8	18	2.05%	0.38%	3.62%	-2.78%	3.57%	-1.37%	-2.10%	-1.05%	-0.40%	5.30%	0.84%	7.25%	0.00%
2.8	19	3.35%	0.16%	4.81%	-2.79%	3.67%	1.52%	-4.33%	-1.05%	-0.40%	5.28%	-4.26%	7.17%	3.08%
2.8	20	1.59%	0.99%	3.45%	-2.43%	5.04%	1.52%	2.28%	-1.49%	-0.40%	5.26%	-4.21%	7.12%	6.12%
2.8	21	1.58%	0.75%	4.57%	-0.66%	5.13%	-1.54%	0.46%	-2.64%	0.00%	7.09%	-4.19%	4.06%	5.15%
2.8	22	4.40%	0.97%	3.47%	-0.83%	5.14%	-1.54%	2.53%	3.58%	4.07%	7.09%	-4.25%	4.13%	5.12%
2.8	23	3.95%	0.76%	3.47%	-0.23%	5.02%	-1.60%	0.48%	3.00%	4.09%	7.11%	-4.21%	4.11%	3.03%
2.8	24	2.26%	0.74%	3.48%	-0.21%	5.03%	-1.79%	0.46%	-1.89%	5.09%	7.11%	-4.25%	4.12%	3.03%
2.8	25	2.26%	0.76%	3.47%	-0.61%	5.13%	-1.53%	0.06%	4.37%	4.11%	7.09%	-11.18%	0.28%	3.03%
3.0	17	-1.32%	0.20%	0.47%	-2.70%	2.09%	-1.29%	2.58%	2.28%	-0.46%	1.37%	0.82%	7.09%	0.00%
3.0	18	-0.21%	0.39%	1.59%	-2.12%	1.98%	-1.36%	-4.27%	2.90%	0.00%	2.51%	0.85%	0.00%	0.00%
3.0	19	-0.23%	0.39%	1.63%	-2.12%	3.66%	-1.36%	-4.30%	-1.41%	0.00%	4.31%	0.85%	0.00%	0.00%
3.0	20	-0.20%	0.39%	2.27%	-0.64%	3.71%	-1.44%	2.63%	-1.46%	0.00%	4.23%	0.79%	0.00%	0.00%
3.0	21	-0.20%	0.39%	1.17%	-0.97%	3.66%	-1.36%	2.54%	-1.46%	0.00%	7.08%	0.85%	0.00%	3.08%
3.0	22	1.13%	0.39%	2.37%	-0.88%	3.43%	1.54%	2.19%	-2.62%	0.00%	7.06%	0.85%	0.00%	0.00%
3.0	23	-1.90%	0.39%	2.37%	-0.97%	3.81%	1.54%	2.52%	-2.56%	0.00%	7.10%	-5.10%	0.00%	3.05%
3.0	24	-0.55%	0.70%	2.37%	-0.84%	5.12%	3.24%	2.52%	1.75%	0.00%	7.11%	-5.05%	0.00%	3.05%
3.0	25	2.28%	3.25%	3.47%	-0.94%	5.13%	3.71%	2.54%	0.34%	0.00%	7.08%	-5.05%	0.00%	0.00%

Table 15: Year by year summated return variable y and variable z, excluding transaction costs (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
2.6	17	-0.51%	-1.60%	-1.30%	-2.12%	-12.82%	9.56%	-0.40%	-9.04%	2.28%	0.94%	2.41%	3.58%	**26.43%**
2.6	18	-0.51%	-1.60%	1.23%	0.22%	-17.82%	9.36%	1.51%	8.19%	2.28%	1.08%	4.59%	4.25%	**32.01%**
2.6	19	-0.46%	-1.38%	0.30%	0.04%	-18.75%	9.36%	2.10%	7.07%	2.28%	0.94%	4.59%	4.21%	**38.58%**
2.6	20	0.51%	-1.38%	0.07%	2.66%	-15.88%	9.36%	1.51%	8.00%	2.28%	1.31%	4.24%	5.62%	**49.87%**
2.6	21	-1.96%	-1.38%	0.97%	2.66%	-9.41%	9.32%	3.25%	9.13%	2.82%	1.39%	3.58%	4.35%	**59.67%**
2.6	22	-1.96%	-1.38%	1.00%	2.66%	-4.63%	9.36%	1.51%	9.13%	2.82%	1.71%	3.84%	4.35%	**58.22%**
2.6	23	-1.96%	-1.38%	-0.46%	2.16%	-2.57%	9.36%	1.37%	9.13%	5.24%	4.27%	3.84%	4.35%	**56.85%**
2.6	24	-1.96%	-1.50%	0.91%	3.04%	-1.83%	5.91%	-0.24%	7.74%	5.24%	5.53%	3.89%	4.35%	**58.52%**
2.6	25	-1.96%	-1.50%	0.91%	4.26%	-7.17%	5.91%	-0.24%	8.21%	3.53%	5.53%	3.89%	4.35%	**56.65%**
2.8	17	-0.50%	-0.82%	-3.17%	-2.66%	-10.77%	3.31%	0.85%	1.52%	2.29%	-0.37%	-5.00%	3.82%	**-0.68%**
2.8	18	-0.51%	-0.82%	0.19%	-2.00%	-10.77%	3.22%	1.99%	-5.76%	2.28%	-0.37%	-0.74%	3.80%	**5.82%**
2.8	19	0.32%	-1.61%	2.29%	-2.01%	-10.77%	3.22%	1.12%	-0.98%	2.30%	-0.37%	-2.10%	3.57%	**11.19%**
2.8	20	-1.98%	-1.61%	1.93%	-2.00%	-0.77%	3.31%	1.14%	4.42%	2.28%	0.93%	-2.10%	3.60%	**33.99%**
2.8	21	-1.99%	-1.61%	1.93%	-2.02%	-0.77%	3.25%	2.13%	4.47%	2.28%	0.93%	-1.58%	3.57%	**30.35%**
2.8	22	-1.98%	-0.61%	1.93%	2.63%	-0.77%	9.35%	1.51%	4.42%	4.50%	1.03%	-1.58%	3.57%	**57.88%**
2.8	23	-1.98%	-0.61%	2.87%	2.65%	-4.77%	6.25%	1.53%	-4.78%	4.47%	1.11%	-0.20%	3.60%	**39.12%**
2.8	24	-1.94%	-0.74%	0.05%	2.65%	-4.00%	2.81%	1.53%	6.59%	4.47%	1.50%	4.24%	4.28%	**44.62%**
2.8	25	-1.96%	-0.74%	1.00%	2.65%	-4.01%	2.72%	1.53%	6.59%	2.93%	1.78%	4.24%	4.37%	**38.34%**
3.0	17	-4.14%	-0.82%	1.20%	0.58%	-4.09%	0.14%	1.24%	-0.66%	2.27%	-0.39%	-5.54%	0.98%	**1.90%**
3.0	18	-3.32%	-0.82%	1.20%	0.61%	-4.09%	3.25%	1.24%	0.00%	2.27%	-0.59%	-5.54%	3.11%	**-0.42%**
3.0	19	-2.00%	-0.82%	0.00%	0.61%	-4.01%	3.21%	1.89%	0.00%	2.27%	-0.25%	-6.15%	3.78%	**-0.05%**
3.0	20	-1.99%	-0.82%	0.00%	-2.00%	-0.77%	3.39%	0.24%	1.00%	2.27%	-0.37%	-2.09%	3.80%	**12.94%**
3.0	21	-1.99%	-0.82%	0.00%	-1.98%	-0.77%	3.24%	1.95%	2.84%	4.48%	-0.37%	-2.38%	3.57%	**22.55%**
3.0	22	-1.99%	-0.82%	0.00%	-2.02%	-0.77%	-0.55%	1.95%	-0.99%	4.51%	-0.26%	-1.56%	3.57%	**16.53%**
3.0	23	-1.99%	-0.95%	-0.19%	-1.98%	0.00%	0.16%	2.11%	-1.64%	2.41%	1.04%	-2.39%	4.92%	**11.75%**
3.0	24	-1.98%	-0.95%	-0.19%	-1.44%	0.00%	-3.32%	2.16%	-3.49%	2.40%	1.03%	-1.59%	4.92%	**16.97%**
3.0	25	-1.12%	-0.74%	-0.19%	2.63%	0.00%	2.81%	2.11%	4.41%	2.40%	1.05%	-1.59%	4.92%	**38.50%**

Table 16: Year by year summated return variable y and variable z, excluding transaction costs (continued)

Appendix II: Year by year number of identified trades while seeking variable y and z

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0.8	18	14	12	17	17	22	17	16	17	15	17	8	11	8
0.8	19	13	12	16	15	22	16	17	18	15	16	8	10	8
1.0	17	11	13	15	15	19	18	16	17	13	17	8	16	9
1.0	18	10	11	15	18	20	17	15	19	13	15	8	17	8
1.0	19	10	11	14	16	20	14	16	18	12	15	9	16	8
1.0	20	11	10	12	16	18	14	15	18	12	14	9	14	8
1.0	21	13	9	11	15	17	14	17	17	13	12	9	12	8
1.0	22	14	10	11	14	18	14	14	15	13	12	8	12	8
1.0	23	13	10	11	13	16	14	15	15	12	12	8	12	9
1.0	24	12	9	11	11	17	15	14	15	12	12	7	13	8
1.0	25	14	9	11	11	16	16	14	14	11	11	7	12	8
1.2	17	10	12	14	15	17	17	12	19	11	17	10	19	8
1.2	18	9	11	12	14	18	15	13	19	10	16	10	18	8
1.2	19	10	11	11	15	16	15	13	19	10	16	10	17	8
1.2	20	10	11	11	15	16	15	12	17	11	15	9	16	8
1.2	21	10	11	11	14	15	16	12	16	11	14	8	17	8
1.2	22	10	11	12	14	15	14	12	15	11	13	8	17	8
1.2	23	10	11	11	14	15	13	12	14	11	13	7	17	8
1.2	24	10	11	11	12	15	13	12	14	12	11	7	16	8
1.2	25	11	11	10	11	15	15	11	14	12	11	7	16	8
1.4	17	9	10	10	15	15	16	11	16	10	13	12	17	10
1.4	18	9	11	10	15	15	15	12	16	10	14	11	17	10
1.4	19	9	12	10	14	16	14	12	15	9	12	11	17	10
1.4	20	10	12	11	14	16	14	11	16	9	12	10	17	9
1.4	21	10	10	11	14	16	13	10	14	9	12	10	16	9

Table 17: Year by year number of trades while seeking variable y and variable z

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
0.8	18	11	10	14	13	7	20	16	21	20	16	15	21	**375**
0.8	19	11	9	13	13	8	19	15	20	19	18	15	20	**366**
1.0	17	13	10	13	16	11	20	19	20	22	18	16	19	**384**
1.0	18	12	9	13	13	8	19	19	19	20	17	16	17	**368**
1.0	19	12	9	13	13	7	18	19	19	21	19	17	19	**365**
1.0	20	11	10	14	13	6	17	18	20	18	18	18	17	**351**
1.0	21	10	11	14	13	6	16	18	21	18	16	16	18	**344**
1.0	22	9	10	13	12	6	16	17	18	18	15	15	16	**328**
1.0	23	10	10	13	11	7	16	14	17	21	16	12	16	**323**
1.0	24	9	10	12	11	6	16	14	18	21	16	12	16	**317**
1.0	25	8	9	13	11	5	16	15	17	20	14	12	17	**311**
1.2	17	14	12	11	15	13	18	21	21	20	19	16	17	**378**
1.2	18	14	12	11	14	12	17	20	19	19	20	16	18	**365**
1.2	19	14	11	12	14	11	17	18	19	20	19	18	16	**360**
1.2	20	12	11	12	13	10	17	18	17	20	17	16	16	**345**
1.2	21	12	10	11	13	8	15	17	16	20	18	15	17	**335**
1.2	22	11	10	12	12	7	15	16	16	20	17	14	16	**326**
1.2	23	11	10	11	12	7	14	16	14	20	16	13	16	**316**
1.2	24	8	10	12	12	6	14	17	14	19	16	13	16	**309**
1.2	25	8	10	13	12	6	14	15	14	18	14	13	15	**304**
1.4	17	13	12	10	14	13	15	18	18	21	21	17	17	**353**
1.4	18	14	11	11	16	12	13	17	16	19	22	17	17	**350**
1.4	19	14	10	11	14	12	13	18	18	19	21	16	16	**343**
1.4	20	13	10	11	15	12	12	18	18	17	20	16	15	**338**
1.4	21	12	10	10	15	11	15	19	16	18	20	13	14	**327**

Table 18: Year by year number of trades while seeking variable y and variable z (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1.4	22	9	10	10	13	15	14	11	14	10	12	10	18	9
1.4	23	9	11	10	12	15	13	10	12	9	12	8	16	9
1.4	24	9	10	10	13	15	13	10	12	9	12	9	16	9
1.4	25	9	10	10	13	14	14	11	12	8	13	8	16	9
1.6	17	11	10	10	14	13	11	12	15	10	14	10	17	7
1.6	18	8	10	9	14	13	12	12	15	10	13	10	17	7
1.6	19	8	10	9	14	14	12	12	13	9	13	9	17	7
1.6	20	9	10	9	14	13	13	9	14	9	14	9	17	7
1.6	21	9	11	9	14	12	13	9	13	9	13	9	17	9
1.6	22	8	11	9	13	12	12	10	11	9	11	7	17	9
1.6	23	8	10	9	13	12	11	9	11	8	11	7	16	9
1.6	24	9	10	9	11	13	12	9	11	7	11	7	18	8
1.6	25	9	11	11	13	12	11	9	9	7	10	8	18	8
1.8	17	9	10	10	11	11	10	12	13	10	11	8	14	7
1.8	18	9	10	8	11	11	10	12	14	9	12	8	14	7
1.8	19	7	10	8	13	11	11	11	13	9	12	8	14	7
1.8	20	7	9	8	13	11	10	11	12	9	13	9	15	8
1.8	21	7	9	8	11	10	9	11	12	9	12	9	15	8
1.8	22	7	9	8	12	11	10	9	10	9	14	9	15	8
1.8	23	7	9	8	13	11	10	9	10	6	13	9	16	8
1.8	24	8	8	8	14	11	9	7	11	6	12	9	16	8
1.8	25	8	8	9	13	10	9	7	10	8	11	9	16	7
2.0	17	7	9	7	10	10	11	11	10	7	8	7	11	4
2.0	18	7	9	7	9	10	11	11	10	8	9	8	11	5
2.0	19	7	9	7	9	10	9	9	10	7	10	8	10	6

Table 19: Year by year number of trades while seeking variable y and variable z (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
1.4	22	12	10	11	16	13	14	18	16	18	17	13	14	**327**
1.4	23	12	11	10	13	12	13	18	15	17	17	12	14	**310**
1.4	24	12	10	10	12	12	12	15	14	16	15	12	14	**301**
1.4	25	11	10	10	13	13	13	14	14	16	15	13	15	**304**
1.6	17	16	13	10	12	13	13	12	18	15	19	19	15	**329**
1.6	18	16	14	10	12	13	12	12	18	15	19	19	17	**327**
1.6	19	13	11	10	12	15	13	12	19	16	18	15	15	**316**
1.6	20	11	11	10	13	13	12	14	17	15	18	15	14	**310**
1.6	21	10	11	9	15	14	12	14	17	14	19	14	12	**308**
1.6	22	12	11	10	14	14	11	12	15	16	18	13	12	**297**
1.6	23	11	10	10	12	14	10	15	16	14	18	13	12	**289**
1.6	24	12	10	11	12	13	11	15	16	12	16	13	13	**289**
1.6	25	10	9	11	12	13	10	15	15	11	15	13	13	**283**
1.8	17	13	12	12	12	12	11	9	14	12	17	18	12	**290**
1.8	18	13	12	10	11	12	10	9	15	12	15	16	11	**281**
1.8	19	14	13	10	10	11	10	9	12	12	15	15	11	**276**
1.8	20	13	13	8	10	10	9	8	13	11	14	14	11	**269**
1.8	21	13	12	9	10	11	9	11	15	10	15	15	11	**271**
1.8	22	14	13	9	9	9	9	11	12	13	15	15	11	**271**
1.8	23	12	10	9	9	12	8	11	14	12	14	13	12	**265**
1.8	24	11	9	9	10	12	8	10	14	11	13	12	12	**258**
1.8	25	10	9	9	12	12	8	12	14	12	13	10	8	**254**
2.0	17	10	10	8	10	10	10	9	15	11	18	17	9	**249**
2.0	18	12	11	9	10	10	9	7	13	10	17	16	8	**247**
2.0	19	11	11	10	11	10	9	8	12	10	18	14	8	**243**

Table 20: Year by year number of trades while seeking variable y and variable z (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.0	20	8	8	8	10	9	10	10	9	8	8	7	9	7
2.0	21	8	8	8	9	9	8	10	9	8	8	7	10	6
2.0	22	8	8	8	10	9	8	8	9	8	8	6	10	6
2.0	23	7	7	8	11	8	8	8	9	7	8	6	8	7
2.0	24	7	7	8	10	8	8	8	8	7	9	8	8	7
2.0	25	8	7	7	11	9	6	8	9	6	10	8	10	8
2.2	17	7	7	7	10	9	9	10	9	6	6	6	6	3
2.2	18	7	7	7	10	9	8	10	8	6	6	7	6	5
2.2	19	7	6	7	10	8	9	10	8	5	6	6	5	4
2.2	20	7	7	7	10	8	7	8	7	6	7	6	5	3
2.2	21	8	7	7	9	8	8	8	7	6	7	6	4	3
2.2	22	6	6	7	9	8	7	7	7	5	7	6	5	3
2.2	23	6	6	7	8	8	6	7	8	5	7	6	5	4
2.2	24	6	6	7	8	8	6	6	7	5	8	7	3	6
2.2	25	7	6	6	8	7	6	7	8	5	7	7	4	6
2.4	17	7	6	6	8	8	8	8	8	4	6	5	4	3
2.4	18	7	6	6	9	8	7	9	7	4	6	6	3	3
2.4	19	7	6	6	9	7	7	9	7	4	6	6	4	2
2.4	20	7	6	7	8	7	6	9	7	4	6	6	3	2
2.4	21	6	6	7	8	8	6	8	7	3	6	6	4	3
2.4	22	5	6	7	7	8	6	8	7	3	6	6	4	3
2.4	23	5	6	7	7	7	6	7	7	3	6	6	4	3
2.4	24	5	6	6	8	6	6	7	7	4	7	5	4	3
2.4	25	4	6	6	8	6	7	7	7	4	7	6	4	3
2.6	17	6	4	5	8	7	4	6	6	2	5	2	1	3

Table 21: Year by year number of trades while seeking variable y and variable z (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
2.0	20	11	12	12	11	11	8	7	12	10	14	14	9	**242**
2.0	21	12	10	11	10	11	8	7	12	11	12	13	10	**235**
2.0	22	11	9	10	8	9	7	7	11	10	12	13	10	**223**
2.0	23	11	11	9	7	8	6	7	11	10	12	12	10	**216**
2.0	24	11	11	9	7	8	7	7	12	9	11	12	8	**215**
2.0	25	10	8	9	7	7	7	8	12	9	11	11	7	**213**
2.2	17	8	6	6	8	8	7	8	11	7	12	14	7	**197**
2.2	18	8	6	6	8	6	9	8	10	8	14	14	8	**201**
2.2	19	9	6	6	8	6	7	7	9	8	15	13	8	**193**
2.2	20	9	6	8	7	7	6	6	10	8	14	14	7	**190**
2.2	21	8	7	9	7	10	5	7	11	7	16	14	6	**195**
2.2	22	9	7	9	7	8	5	7	10	7	16	12	6	**186**
2.2	23	9	7	10	8	8	4	7	10	8	15	11	6	**186**
2.2	24	8	8	10	8	7	4	7	11	8	14	10	5	**183**
2.2	25	8	7	10	8	7	4	7	10	9	11	10	4	**179**
2.4	17	5	5	6	4	8	5	6	9	5	8	12	6	**160**
2.4	18	6	4	6	4	7	5	6	8	5	8	12	6	**158**
2.4	19	6	4	6	4	7	4	6	8	5	7	12	5	**154**
2.4	20	5	4	6	5	9	3	6	8	6	10	12	5	**157**
2.4	21	4	4	5	6	6	3	7	8	7	11	11	6	**156**
2.4	22	5	5	5	7	7	4	7	8	7	12	11	6	**160**
2.4	23	5	5	5	7	5	4	7	8	6	10	12	4	**152**
2.4	24	6	3	6	7	6	4	7	9	6	9	11	3	**151**
2.4	25	6	3	7	7	6	3	7	8	6	10	11	3	**152**
2.6	17	5	3	5	4	5	4	5	7	4	5	8	4	**118**

Table 22: Year by year number of trades while seeking variable y and variable z (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.6	18	6	4	6	7	5	5	7	5	2	4	3	2	2
2.6	19	6	5	6	7	6	5	8	6	2	4	4	2	2
2.6	20	4	5	6	7	6	5	6	7	2	4	5	2	2
2.6	21	5	5	6	7	6	6	6	7	2	4	6	2	2
2.6	22	5	5	5	6	6	5	7	7	2	4	6	3	2
2.6	23	5	6	5	6	5	5	6	7	2	3	6	3	2
2.6	24	5	6	5	6	5	5	6	7	2	3	5	3	2
2.6	25	3	5	6	6	5	5	6	7	2	3	5	3	2
2.8	17	4	3	3	5	4	2	3	5	1	3	1	1	1
2.8	18	5	3	4	7	4	1	4	4	1	4	1	1	0
2.8	19	5	4	5	7	3	2	4	4	1	4	2	1	1
2.8	20	4	3	4	6	5	2	5	3	1	4	2	1	2
2.8	21	4	4	5	5	4	5	3	3	0	3	2	2	2
2.8	22	4	3	4	5	4	5	2	5	1	3	2	2	2
2.8	23	3	4	4	6	5	5	3	7	1	3	2	2	1
2.8	24	1	4	4	6	5	6	3	5	1	3	2	2	1
2.8	25	1	4	4	6	4	5	5	4	1	3	3	3	1
3.0	17	3	2	2	4	2	2	1	4	1	3	1	1	0
3.0	18	3	3	3	4	3	1	2	3	0	3	1	0	0
3.0	19	3	3	2	4	3	1	2	3	0	3	1	0	0
3.0	20	3	3	3	4	3	1	1	3	0	2	1	0	0
3.0	21	3	3	2	5	3	1	2	3	0	3	1	0	1
3.0	22	3	3	3	5	3	2	2	2	0	3	1	0	0
3.0	23	2	3	3	5	3	2	2	2	0	3	1	0	1
3.0	24	1	3	3	5	4	3	2	1	0	3	1	0	1
3.0	25	1	3	4	5	4	4	2	2	0	3	1	0	0

Table 23: Year by year number of trades while seeking variable y and variable z (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
2.6	18	5	3	6	4	5	3	6	6	4	6	10	5	**121**
2.6	19	5	3	5	4	7	3	5	6	4	5	11	5	**126**
2.6	20	4	3	5	4	8	3	6	6	4	5	9	4	**122**
2.6	21	3	3	5	4	5	3	6	6	4	6	8	3	**120**
2.6	22	3	3	5	4	4	3	6	6	4	6	8	3	**118**
2.6	23	3	3	5	4	4	3	6	6	4	6	7	3	**115**
2.6	24	3	2	5	5	3	2	6	5	4	7	9	3	**114**
2.6	25	3	2	5	6	3	2	6	5	4	7	9	3	**113**
2.8	17	5	2	3	4	4	3	4	3	4	5	5	4	**82**
2.8	18	5	2	2	4	4	3	4	3	4	5	6	4	**85**
2.8	19	4	3	3	4	4	3	5	4	4	5	5	4	**91**
2.8	20	3	3	3	4	1	3	5	4	4	5	5	4	**86**
2.8	21	3	3	3	4	1	3	5	4	4	5	4	4	**85**
2.8	22	3	2	3	4	1	3	6	4	3	4	4	4	**83**
2.8	23	3	2	4	4	4	2	6	5	3	5	6	4	**94**
2.8	24	3	1	5	4	3	1	6	4	3	5	7	3	**88**
2.8	25	3	1	5	4	3	1	6	4	2	5	7	3	**88**
3.0	17	4	2	1	3	2	2	4	1	4	4	4	2	**59**
3.0	18	3	2	1	3	2	3	4	0	4	5	4	3	**60**
3.0	19	3	2	0	3	2	3	4	0	4	5	4	4	**59**
3.0	20	3	2	0	4	1	3	4	1	4	5	5	4	**60**
3.0	21	3	2	0	4	1	3	4	2	3	5	4	4	**62**
3.0	22	3	2	0	4	1	2	4	4	3	4	4	4	**62**
3.0	23	3	1	2	4	0	2	5	5	2	4	4	3	**62**
3.0	24	3	1	2	5	0	1	5	5	2	4	4	3	**62**
3.0	25	2	1	2	4	0	1	5	4	2	4	4	3	**61**

Table 24: Year by year number of trades while seeking variable y and variable z (continued)

Appendix III: Year by year summated returns variable y and variable z. including transaction costs

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0.8	18	4.46%	3.67%	-6.32%	-4.17%	12.21%	12.91%	-1.85%	21.48%	13.95%	-6.03%	-8.17%	-12.19%	8.91%
0.8	19	4.47%	2.21%	-5.30%	-3.48%	11.81%	13.89%	-1.22%	16.57%	15.86%	-8.89%	-12.03%	-10.09%	8.88%
1.0	17	8.10%	5.87%	-0.48%	-6.69%	15.04%	9.46%	-2.41%	15.05%	16.31%	8.43%	-6.63%	-29.87%	9.10%
1.0	18	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.0	19	11.47%	5.84%	1.57%	-4.63%	14.30%	4.24%	-2.04%	20.10%	17.97%	5.91%	-8.67%	-22.13%	9.77%
1.0	20	8.02%	5.79%	0.16%	-1.00%	13.97%	5.12%	-4.81%	19.73%	19.75%	0.86%	-10.59%	-31.07%	9.74%
1.0	21	7.33%	4.17%	-1.03%	-3.04%	12.88%	5.33%	-2.89%	15.71%	19.80%	-0.11%	-12.94%	-15.82%	7.58%
1.0	22	5.28%	3.47%	-0.58%	-0.33%	12.37%	7.26%	-7.96%	13.41%	17.15%	-6.50%	-7.45%	-17.06%	6.88%
1.0	23	4.99%	3.29%	-1.51%	-2.72%	10.65%	13.12%	-5.84%	12.33%	14.35%	-3.64%	-7.42%	-19.34%	6.39%
1.0	24	5.34%	4.13%	-1.54%	-0.63%	11.73%	9.18%	-5.90%	12.26%	14.33%	-3.21%	-5.37%	-18.25%	10.59%
1.0	25	6.09%	3.89%	-1.95%	-1.01%	11.34%	7.75%	-4.77%	10.98%	13.68%	-2.36%	-5.74%	-15.74%	12.77%
1.2	17	11.17%	4.22%	3.12%	-11.44%	13.50%	11.28%	-4.54%	19.79%	13.51%	6.61%	-6.74%	-42.18%	11.14%
1.2	18	11.73%	3.01%	0.38%	-9.80%	14.15%	9.61%	-5.61%	16.76%	15.19%	5.38%	-9.48%	-40.82%	11.09%
1.2	19	11.64%	3.67%	1.62%	-7.18%	14.22%	6.84%	-4.67%	17.99%	15.20%	-0.19%	-10.05%	-38.77%	11.11%
1.2	20	11.40%	3.67%	0.52%	-8.09%	12.85%	6.84%	-8.34%	9.42%	19.66%	5.87%	-4.62%	-36.75%	11.14%
1.2	21	11.35%	6.72%	0.52%	-10.13%	13.05%	3.05%	-9.15%	8.32%	17.59%	4.28%	-4.38%	-26.34%	11.11%
1.2	22	12.30%	6.72%	1.00%	-10.97%	12.60%	1.98%	-11.79%	8.65%	17.51%	7.18%	-4.42%	-26.34%	11.17%
1.2	23	11.83%	5.94%	2.15%	-10.19%	12.76%	4.75%	-11.83%	10.37%	18.60%	7.18%	-0.54%	-26.13%	10.58%
1.2	24	11.83%	6.59%	2.17%	-6.09%	12.76%	5.51%	-12.56%	13.43%	15.88%	8.62%	-1.59%	-24.30%	9.77%
1.2	25	9.02%	6.59%	0.97%	-4.84%	12.78%	4.81%	-11.15%	12.68%	15.88%	7.74%	-1.59%	-24.20%	9.70%
1.4	17	12.72%	7.05%	3.45%	-9.38%	10.46%	7.88%	-3.92%	16.04%	8.35%	9.00%	-11.46%	-35.35%	7.87%
1.4	18	11.69%	6.89%	5.28%	-9.46%	12.00%	4.02%	-2.06%	14.21%	9.24%	6.72%	-14.97%	-46.41%	7.92%
1.4	19	11.37%	6.18%	3.25%	-9.03%	12.82%	5.91%	-3.15%	12.44%	13.05%	11.99%	-14.85%	-45.51%	8.45%
1.4	20	11.19%	5.74%	2.21%	-12.23%	12.77%	5.49%	-5.28%	6.70%	13.11%	11.99%	-9.58%	-46.12%	12.10%
1.4	21	11.19%	5.17%	4.51%	-12.56%	13.17%	5.46%	-7.99%	11.27%	13.11%	9.72%	-9.36%	-45.46%	7.54%

Table 25: Year by year summated return variable y and variable z. including transaction costs

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
0.8	18	5.27%	3.42%	-1.52%	-0.57%	-1.11%	9.66%	10.25%	3.30%	2.17%	5.36%	9.68%	-0.63%	**84.14%**
0.8	19	2.07%	3.42%	1.48%	-0.46%	-7.82%	6.98%	9.96%	1.67%	5.59%	3.33%	8.85%	-1.48%	**66.24%**
1.0	17	2.84%	2.96%	1.53%	-3.44%	-23.40%	10.24%	3.36%	6.67%	4.95%	2.51%	9.63%	-3.95%	**55.15%**
1.0	18	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.78%**
1.0	19	6.48%	1.87%	0.27%	3.95%	-1.98%	8.94%	-3.17%	5.44%	7.12%	8.64%	6.58%	-0.21%	**97.61%**
1.0	20	7.53%	1.40%	-3.22%	2.06%	-0.22%	12.08%	-1.79%	2.69%	5.44%	6.39%	6.51%	-0.44%	**74.10%**
1.0	21	5.76%	1.22%	-1.50%	2.23%	-0.13%	14.17%	5.80%	6.24%	5.94%	6.20%	5.42%	0.74%	**89.04%**
1.0	22	8.64%	1.42%	-2.17%	0.29%	-0.38%	11.61%	9.49%	5.84%	4.51%	6.26%	7.89%	1.14%	**80.46%**
1.0	23	10.08%	3.29%	-2.63%	2.08%	-14.20%	9.89%	12.53%	5.57%	6.13%	4.23%	7.16%	2.44%	**71.22%**
1.0	24	7.23%	2.83%	0.88%	-1.43%	-10.64%	7.82%	9.81%	8.10%	6.29%	3.78%	7.21%	0.00%	**74.53%**
1.0	25	5.71%	4.59%	0.49%	-2.89%	-4.80%	4.96%	9.76%	5.80%	2.98%	5.71%	7.14%	0.03%	**74.41%**
1.2	17	4.00%	2.07%	5.42%	0.71%	-29.69%	10.29%	-1.61%	7.84%	7.93%	4.86%	6.32%	-0.20%	**47.36%**
1.2	18	3.97%	1.10%	2.59%	-1.07%	-31.94%	8.45%	-3.95%	7.19%	10.09%	3.73%	5.99%	-0.47%	**27.24%**
1.2	19	3.99%	1.22%	1.85%	-0.07%	-19.33%	8.45%	6.39%	6.80%	7.84%	6.48%	7.39%	2.19%	**54.61%**
1.2	20	5.70%	1.24%	1.89%	-1.29%	-23.59%	6.87%	6.22%	10.31%	3.92%	6.01%	6.22%	2.90%	**49.94%**
1.2	21	5.70%	3.29%	1.60%	-3.42%	-17.10%	14.34%	-4.12%	8.96%	6.36%	5.34%	6.15%	2.40%	**55.47%**
1.2	22	9.40%	0.79%	2.89%	0.39%	-20.87%	14.34%	0.17%	9.62%	6.12%	4.74%	5.59%	5.16%	**63.90%**
1.2	23	9.67%	0.99%	1.69%	1.62%	-8.08%	15.07%	-4.92%	10.07%	6.12%	6.35%	5.45%	5.16%	**84.63%**
1.2	24	8.30%	1.01%	1.31%	-1.22%	-5.08%	15.07%	-6.89%	6.49%	4.02%	6.35%	5.45%	3.81%	**80.62%**
1.2	25	8.30%	1.83%	-2.18%	-1.79%	-11.73%	14.04%	-6.00%	9.93%	4.08%	7.00%	5.14%	3.27%	**70.27%**
1.4	17	4.50%	0.74%	7.70%	-2.39%	-46.99%	14.47%	1.83%	14.37%	7.28%	0.43%	6.15%	-2.15%	**28.65%**
1.4	18	0.90%	1.32%	6.87%	-3.59%	-41.74%	12.71%	-3.75%	14.27%	7.86%	3.42%	6.24%	-2.35%	**7.21%**
1.4	19	1.68%	2.68%	6.87%	-4.52%	-41.53%	11.54%	-10.59%	13.55%	7.52%	3.77%	4.20%	-0.07%	**8.00%**
1.4	20	3.04%	2.84%	6.87%	-1.91%	-40.52%	11.05%	-7.66%	8.77%	11.04%	2.62%	5.88%	1.30%	**11.39%**
1.4	21	6.61%	2.88%	4.35%	-1.94%	-44.07%	18.90%	-13.84%	10.94%	12.46%	1.82%	6.29%	4.41%	**14.57%**

Table 26: Year by year summated return variable y and variable z. including transaction costs (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1.4	22	11.72%	5.55%	2.77%	-11.81%	12.76%	4.20%	-9.63%	10.72%	12.65%	9.72%	-6.84%	-38.96%	7.54%
1.4	23	11.67%	6.61%	2.63%	-10.13%	12.76%	6.47%	-1.45%	8.02%	11.62%	4.22%	-0.84%	-45.46%	7.04%
1.4	24	10.95%	6.39%	1.66%	-8.97%	11.58%	6.47%	-2.62%	8.08%	9.72%	4.18%	0.62%	-35.72%	7.04%
1.4	25	11.58%	6.39%	1.66%	-9.89%	11.91%	6.18%	-2.04%	8.04%	15.84%	6.83%	0.74%	-36.58%	7.04%
1.6	17	10.57%	5.46%	4.74%	-5.70%	9.63%	-1.44%	-3.05%	8.53%	8.50%	6.08%	-16.08%	-26.95%	11.81%
1.6	18	12.91%	5.48%	4.12%	-5.96%	9.05%	-2.14%	-3.03%	12.51%	10.64%	9.27%	-16.01%	-29.68%	11.62%
1.6	19	12.95%	5.71%	4.30%	-9.71%	10.12%	1.49%	-7.14%	5.42%	8.51%	11.72%	-9.71%	-30.01%	11.63%
1.6	20	12.67%	5.45%	3.76%	-9.62%	9.38%	-0.04%	-9.32%	5.00%	8.45%	11.20%	-11.57%	-31.48%	11.66%
1.6	21	12.04%	7.21%	3.77%	-9.52%	8.96%	1.21%	-7.31%	5.69%	8.46%	8.79%	-11.52%	-32.82%	13.22%
1.6	22	11.26%	7.16%	3.74%	-9.82%	8.94%	2.17%	4.10%	3.15%	7.17%	15.05%	-7.02%	-31.57%	12.40%
1.6	23	11.94%	6.99%	3.36%	-11.30%	9.90%	2.88%	0.39%	3.03%	7.03%	12.83%	-7.10%	-31.07%	12.63%
1.6	24	11.51%	6.99%	3.19%	-11.40%	10.93%	5.44%	0.39%	3.06%	9.77%	12.81%	-7.57%	-41.90%	10.44%
1.6	25	11.48%	6.44%	2.04%	-12.16%	9.53%	4.71%	-0.91%	4.42%	10.11%	9.51%	-6.44%	-42.43%	10.44%
1.8	17	11.36%	4.51%	4.90%	-1.14%	7.93%	2.35%	-1.53%	5.72%	8.54%	14.33%	-7.43%	-21.19%	12.96%
1.8	18	11.43%	3.42%	3.74%	-3.73%	7.61%	3.12%	-2.10%	-2.47%	8.61%	14.92%	-6.38%	-20.25%	12.93%
1.8	19	11.57%	4.36%	3.94%	-6.49%	7.94%	-1.36%	-4.94%	0.31%	7.67%	14.87%	-6.44%	-18.81%	12.91%
1.8	20	11.57%	4.16%	3.55%	-6.83%	8.60%	-2.29%	-4.17%	2.65%	8.62%	11.87%	-8.68%	-20.55%	9.61%
1.8	21	11.61%	4.15%	3.57%	-4.92%	8.15%	-0.95%	-4.94%	1.11%	8.63%	12.81%	-9.69%	-21.89%	10.02%
1.8	22	12.60%	4.45%	3.57%	-7.02%	7.99%	0.16%	-0.09%	3.11%	8.39%	13.31%	-9.69%	-24.00%	10.05%
1.8	23	13.29%	4.42%	3.57%	-8.28%	7.95%	0.14%	-0.04%	3.14%	9.85%	13.51%	-9.66%	-26.68%	10.04%
1.8	24	12.67%	3.39%	1.74%	-9.83%	7.99%	3.82%	0.70%	3.16%	9.91%	10.22%	-9.54%	-26.65%	9.88%
1.8	25	12.64%	3.70%	3.78%	-7.95%	6.56%	1.88%	1.01%	2.56%	13.24%	7.34%	-9.58%	-29.52%	9.47%
2.0	17	7.70%	3.54%	3.56%	-0.14%	6.28%	-1.31%	2.93%	-0.99%	0.75%	8.88%	-7.97%	-18.49%	7.48%
2.0	18	11.33%	3.93%	3.28%	-1.10%	7.25%	-1.34%	1.29%	0.03%	1.26%	8.07%	-14.95%	-17.95%	5.87%
2.0	19	11.07%	4.10%	3.79%	-1.10%	6.91%	2.55%	-3.94%	-0.02%	4.46%	11.10%	-13.75%	-14.03%	6.44%

Table 27: Year by year summated return variable y and variable z. including transaction costs (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
1.4	22	6.89%	2.88%	3.00%	0.02%	-39.74%	14.94%	-9.22%	10.94%	12.46%	3.39%	5.62%	3.86%	**25.42%**
1.4	23	6.93%	2.51%	2.89%	-0.99%	-33.73%	15.47%	-7.92%	10.62%	10.55%	5.52%	5.44%	5.78%	**36.18%**
1.4	24	3.47%	2.43%	2.89%	-1.31%	-34.29%	23.71%	0.76%	12.85%	8.65%	6.66%	8.12%	5.85%	**59.14%**
1.4	25	4.51%	2.47%	2.89%	-3.75%	-31.90%	29.18%	-2.78%	11.26%	2.84%	4.35%	6.58%	4.43%	**57.76%**
1.6	17	2.53%	-0.77%	7.25%	-0.69%	-40.74%	11.85%	-5.26%	11.12%	7.33%	1.60%	0.46%	-6.81%	**-0.04%**
1.6	18	0.59%	-0.97%	7.67%	-1.95%	-40.77%	14.90%	-7.20%	10.37%	7.32%	3.23%	0.86%	-2.84%	**9.96%**
1.6	19	0.92%	1.19%	7.67%	-4.44%	-51.75%	15.87%	-8.24%	6.85%	6.50%	2.00%	7.41%	0.59%	**-0.19%**
1.6	20	5.68%	2.12%	7.70%	-8.30%	-52.52%	21.44%	-8.52%	6.10%	6.93%	3.37%	5.56%	0.20%	**-4.72%**
1.6	21	4.39%	2.08%	7.06%	-4.54%	-56.32%	21.49%	-7.00%	6.12%	4.53%	3.86%	5.35%	1.40%	**-3.44%**
1.6	22	4.10%	2.17%	7.85%	-5.38%	-56.41%	19.03%	-5.76%	6.21%	2.68%	3.46%	5.17%	2.00%	**11.82%**
1.6	23	0.90%	2.68%	7.88%	-3.50%	-53.41%	27.25%	-5.40%	4.99%	4.81%	3.46%	5.97%	3.64%	**20.76%**
1.6	24	1.18%	2.63%	7.04%	-3.52%	-50.84%	26.85%	-10.10%	4.90%	5.05%	4.57%	5.99%	2.03%	**9.41%**
1.6	25	1.71%	-0.85%	7.02%	-2.69%	-49.01%	30.19%	-14.23%	7.22%	7.51%	4.03%	6.02%	2.50%	**6.12%**
1.8	17	-2.81%	-1.73%	7.28%	-2.85%	-39.64%	16.97%	-4.84%	11.64%	1.42%	7.21%	3.37%	-6.48%	**30.83%**
1.8	18	-2.81%	-1.94%	7.24%	-3.70%	-39.92%	26.93%	-6.26%	19.77%	2.57%	4.92%	3.40%	-5.20%	**35.85%**
1.8	19	-0.07%	0.08%	7.24%	-4.73%	-38.82%	27.38%	-6.29%	17.42%	2.53%	4.92%	4.80%	-5.20%	**34.78%**
1.8	20	1.66%	0.04%	6.27%	-4.73%	-38.50%	29.71%	-2.00%	16.72%	3.57%	7.16%	4.42%	-5.26%	**37.16%**
1.8	21	3.58%	0.30%	7.05%	-5.20%	-38.92%	29.67%	-6.50%	14.82%	1.18%	4.43%	0.25%	-0.62%	**27.69%**
1.8	22	1.70%	0.85%	7.07%	-1.89%	-38.24%	29.76%	-6.58%	15.98%	1.81%	3.55%	-0.29%	-0.62%	**35.92%**
1.8	23	0.68%	2.25%	7.53%	-1.93%	-51.94%	26.85%	-6.53%	5.01%	4.20%	4.26%	3.19%	1.42%	**16.24%**
1.8	24	3.44%	2.36%	7.53%	-4.10%	-52.73%	26.68%	-4.18%	6.28%	3.01%	5.23%	6.29%	1.45%	**18.68%**
1.8	25	3.11%	3.21%	7.53%	-5.33%	-52.78%	26.73%	-3.79%	6.21%	4.79%	5.62%	6.57%	2.00%	**18.97%**
2.0	17	-4.14%	-8.17%	5.14%	0.76%	-31.38%	26.53%	-5.71%	19.37%	-0.94%	4.86%	2.48%	-6.12%	**14.90%**
2.0	18	-4.42%	-2.67%	5.14%	1.68%	-30.45%	27.98%	-6.15%	17.40%	1.71%	6.37%	3.07%	-5.71%	**20.90%**
2.0	19	-2.35%	-3.24%	3.27%	-0.38%	-30.92%	29.07%	-7.50%	17.48%	-1.51%	7.27%	2.85%	-5.24%	**26.38%**

Table 28: Year by year summated return variable y and variable z. including transaction costs (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.0	20	11.46%	3.90%	3.61%	-2.24%	6.42%	2.35%	-5.13%	-1.03%	6.42%	8.43%	-2.44%	-10.13%	9.94%
2.0	21	11.12%	3.89%	3.82%	-2.89%	6.50%	2.89%	-7.00%	-0.49%	7.14%	8.59%	-0.96%	-13.55%	8.86%
2.0	22	13.71%	3.92%	4.30%	-3.64%	6.47%	2.83%	-2.75%	0.23%	10.72%	8.58%	-1.76%	-12.50%	8.80%
2.0	23	10.72%	3.05%	3.97%	-5.62%	5.78%	2.81%	0.33%	-1.21%	12.24%	8.36%	-1.76%	-8.06%	9.23%
2.0	24	10.71%	3.05%	4.05%	-5.26%	6.04%	2.83%	0.34%	0.77%	12.25%	7.86%	-9.50%	-7.60%	8.79%
2.0	25	9.00%	3.06%	3.05%	-4.70%	7.25%	4.13%	0.29%	-0.98%	10.12%	11.07%	-9.50%	-13.24%	9.11%
2.2	17	7.37%	2.16%	5.41%	-2.43%	5.39%	-4.44%	-2.64%	-0.34%	4.55%	6.90%	-16.23%	-3.95%	5.64%
2.2	18	7.72%	2.16%	5.41%	-3.52%	5.41%	-4.26%	-3.02%	-1.81%	4.52%	6.90%	-16.96%	-3.88%	5.67%
2.2	19	7.69%	2.07%	4.23%	-3.52%	4.36%	-3.54%	-2.64%	-1.76%	4.22%	6.67%	-11.57%	-1.31%	7.49%
2.2	20	7.75%	3.02%	3.76%	-3.56%	4.38%	-1.48%	-2.32%	-1.23%	0.56%	9.23%	-11.57%	-1.31%	7.22%
2.2	21	12.73%	3.02%	3.78%	-2.49%	4.40%	-0.74%	4.20%	-0.19%	4.30%	9.23%	-11.52%	-0.39%	7.16%
2.2	22	8.03%	1.94%	3.78%	-2.22%	5.77%	-1.48%	4.17%	-0.20%	7.98%	9.18%	-11.57%	-1.50%	7.22%
2.2	23	7.00%	2.51%	3.81%	-0.37%	5.77%	4.19%	4.21%	0.34%	8.43%	9.01%	-11.52%	-1.50%	11.00%
2.2	24	6.12%	2.53%	3.98%	-0.37%	5.79%	4.20%	1.46%	-0.18%	8.45%	6.76%	-10.44%	3.85%	3.42%
2.2	25	7.51%	2.53%	2.80%	-1.05%	5.33%	4.17%	0.35%	-2.28%	8.44%	8.89%	-10.52%	3.62%	7.30%
2.4	17	6.53%	0.95%	4.38%	-5.03%	4.30%	-6.18%	-5.89%	0.32%	-0.79%	3.53%	-13.76%	-1.07%	3.56%
2.4	18	6.22%	1.81%	4.38%	-2.67%	5.13%	-5.60%	-5.87%	-1.69%	2.10%	3.46%	-15.01%	-0.20%	3.53%
2.4	19	6.09%	1.81%	4.38%	-2.64%	4.69%	-5.02%	-5.03%	-0.92%	2.06%	1.54%	-16.20%	-1.03%	5.34%
2.4	20	6.08%	1.81%	5.38%	-2.32%	4.66%	-4.99%	-5.02%	-2.13%	2.07%	2.14%	-16.17%	-0.14%	5.34%
2.4	21	4.69%	1.77%	5.38%	-2.98%	4.39%	-2.12%	0.73%	-1.18%	5.10%	2.16%	-16.17%	-0.34%	7.20%
2.4	22	3.23%	1.81%	5.38%	-1.13%	4.37%	-2.09%	2.29%	-1.15%	5.10%	2.16%	-20.80%	-0.34%	7.17%
2.4	23	3.23%	1.49%	3.75%	-1.13%	3.30%	-0.92%	2.62%	-1.18%	2.11%	2.08%	-20.87%	-0.53%	7.16%
2.4	24	3.23%	1.97%	2.79%	-0.91%	2.78%	0.36%	2.89%	-2.04%	3.26%	7.10%	-9.58%	-0.45%	7.13%
2.4	25	3.77%	1.97%	2.81%	-0.67%	3.61%	-1.51%	4.63%	-1.19%	6.24%	7.11%	-10.36%	-0.35%	7.19%
2.6	17	4.93%	-0.74%	2.93%	-5.03%	3.11%	2.04%	-2.70%	-0.18%	-1.62%	3.11%	-4.99%	8.89%	3.60%

Table 29: Year by year summated return variable y and variable z. including transaction costs (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
2.0	20	-3.58%	-0.79%	4.28%	-2.21%	-34.53%	30.27%	-3.68%	17.48%	-0.26%	7.35%	2.45%	-3.62%	**44.75%**
2.0	21	0.09%	-0.60%	4.36%	-3.32%	-34.68%	29.99%	-4.73%	15.46%	0.79%	6.34%	2.35%	-3.23%	**40.75%**
2.0	22	-1.97%	-0.26%	3.85%	-2.21%	-24.77%	26.88%	-5.19%	19.05%	2.57%	5.98%	4.98%	-3.21%	**64.61%**
2.0	23	0.51%	1.63%	7.04%	-3.99%	-27.88%	23.11%	-5.18%	19.06%	2.54%	6.39%	5.36%	-3.25%	**65.16%**
2.0	24	1.22%	0.75%	7.05%	-3.97%	-27.93%	26.23%	-4.81%	17.81%	5.17%	7.33%	5.38%	-3.21%	**65.31%**
2.0	25	2.64%	3.10%	7.10%	-2.06%	-24.16%	26.18%	-5.40%	17.82%	5.13%	7.30%	5.54%	-0.33%	**71.51%**
2.2	17	0.57%	-6.58%	-0.16%	-1.26%	-27.11%	16.30%	-7.72%	9.19%	1.06%	-0.86%	-0.31%	-3.68%	**-13.20%**
2.2	18	-5.49%	-6.13%	-0.17%	2.47%	-12.72%	28.35%	-8.04%	4.87%	1.78%	2.62%	-0.82%	-4.12%	**6.92%**
2.2	19	-6.38%	-6.15%	-0.13%	1.54%	-12.91%	24.94%	-5.73%	7.59%	2.05%	1.41%	-1.50%	-4.12%	**13.00%**
2.2	20	-6.80%	-6.52%	1.59%	0.56%	-14.07%	21.85%	-4.28%	16.48%	2.86%	7.12%	1.62%	-2.66%	**32.20%**
2.2	21	-4.20%	-6.53%	1.79%	0.57%	-27.89%	18.99%	-5.41%	16.05%	0.88%	8.96%	2.78%	-1.41%	**38.05%**
2.2	22	-4.62%	-3.31%	1.79%	2.32%	-23.09%	18.99%	-5.44%	16.57%	0.88%	8.37%	4.15%	-0.95%	**46.75%**
2.2	23	-4.58%	-3.31%	2.62%	0.22%	-22.91%	17.31%	-5.85%	16.50%	-1.72%	9.34%	5.34%	-0.95%	**54.88%**
2.2	24	-3.24%	-2.57%	2.58%	-1.87%	-19.24%	17.31%	-5.11%	16.89%	0.86%	9.30%	5.20%	0.63%	**56.31%**
2.2	25	-3.24%	-0.49%	2.54%	-1.87%	-21.11%	16.27%	-5.16%	15.84%	2.10%	6.82%	5.23%	0.31%	**54.32%**
2.4	17	-2.19%	-3.34%	-0.09%	1.18%	-18.80%	10.71%	1.00%	8.31%	0.64%	0.01%	0.80%	-0.21%	**-11.14%**
2.4	18	-3.85%	-2.63%	-0.09%	1.16%	-21.32%	10.71%	-0.82%	7.77%	1.17%	-0.34%	-1.54%	-0.75%	**-14.93%**
2.4	19	-3.85%	-5.22%	0.11%	1.16%	-21.28%	9.79%	-0.74%	7.77%	1.18%	1.20%	0.34%	2.36%	**-12.11%**
2.4	20	-2.63%	-5.22%	-0.17%	1.20%	-20.56%	8.14%	-0.84%	7.76%	-0.13%	0.38%	-0.17%	2.34%	**-13.20%**
2.4	21	-4.73%	-5.23%	-0.99%	2.01%	-17.41%	8.29%	-3.91%	7.80%	-0.18%	3.96%	0.19%	0.19%	**-1.39%**
2.4	22	-6.10%	-6.01%	-0.98%	0.00%	-22.44%	17.40%	-5.79%	7.73%	0.26%	3.11%	-0.63%	2.65%	**-4.80%**
2.4	23	-6.12%	-5.36%	-0.99%	0.87%	-12.96%	17.40%	-4.58%	7.73%	3.47%	6.79%	2.70%	1.10%	**11.16%**
2.4	24	-4.97%	-2.39%	0.22%	-1.58%	-14.82%	17.40%	-5.53%	13.57%	3.45%	6.00%	2.92%	1.65%	**34.44%**
2.4	25	-4.93%	-2.39%	1.08%	0.58%	-14.70%	14.31%	-5.44%	12.51%	3.43%	5.70%	3.82%	2.11%	**39.31%**
2.6	17	-2.39%	-2.73%	-3.18%	-3.62%	-14.70%	8.06%	-2.28%	-11.67%	0.78%	-0.94%	-0.59%	2.08%	**-17.82%**

Table 30: Year by year summated return variable y and variable z. including transaction costs (continued)

# SD:	# MDA:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.6	18	3.02%	-0.75%	3.70%	-5.40%	3.15%	-3.60%	-5.14%	-3.35%	-1.63%	3.76%	-8.02%	6.36%	5.36%
2.6	19	5.80%	3.17%	4.40%	-5.32%	4.24%	-3.44%	-5.88%	-5.10%	2.94%	3.76%	-10.75%	5.50%	5.33%
2.6	20	2.90%	3.17%	4.40%	-4.30%	4.24%	-3.44%	-0.38%	-1.70%	2.94%	3.76%	-13.74%	5.50%	5.33%
2.6	21	3.63%	3.17%	4.40%	-4.30%	4.24%	-4.03%	-1.75%	-1.70%	2.94%	3.82%	-10.30%	5.50%	5.33%
2.6	22	3.63%	3.17%	3.00%	-2.43%	4.24%	-2.84%	0.12%	-0.90%	2.90%	3.76%	-15.05%	1.27%	5.33%
2.6	23	3.63%	0.93%	3.00%	-2.46%	3.16%	-2.84%	0.31%	-4.16%	2.87%	5.99%	-14.99%	-0.14%	5.33%
2.6	24	3.63%	0.93%	3.00%	-2.46%	3.16%	-2.84%	0.35%	0.98%	2.87%	5.99%	-15.88%	-0.11%	5.33%
2.6	25	2.74%	4.05%	4.40%	-2.46%	3.16%	-3.05%	1.20%	0.98%	2.87%	5.99%	-15.83%	-0.19%	5.33%
2.8	17	0.07%	-0.73%	0.48%	-4.36%	2.07%	-2.03%	-3.77%	-0.39%	-0.84%	1.39%	0.47%	6.72%	-1.77%
2.8	18	0.18%	-0.75%	2.12%	-5.41%	2.07%	-1.75%	-3.60%	-2.55%	-0.78%	3.80%	0.47%	6.88%	0.00%
2.8	19	1.48%	-1.34%	2.94%	-5.42%	2.55%	0.77%	-5.83%	-2.55%	-0.78%	3.78%	-5.01%	6.80%	2.71%
2.8	20	0.09%	-0.14%	1.95%	-4.68%	3.17%	0.77%	0.41%	-2.62%	-0.78%	3.76%	-4.96%	6.75%	5.37%
2.8	21	0.08%	-0.75%	2.70%	-2.54%	3.63%	-3.42%	-0.67%	-3.77%	0.00%	5.97%	-4.94%	3.31%	4.40%
2.8	22	2.90%	-0.16%	1.97%	-2.71%	3.64%	-3.42%	1.78%	1.71%	3.70%	5.97%	-5.00%	3.38%	4.37%
2.8	23	2.83%	-0.74%	1.97%	-2.48%	3.15%	-3.48%	-0.65%	0.38%	3.72%	5.99%	-4.96%	3.36%	2.66%
2.8	24	1.89%	-0.76%	1.98%	-2.46%	3.16%	-4.04%	-0.67%	-3.77%	4.72%	5.99%	-5.00%	3.37%	2.66%
2.8	25	1.89%	-0.74%	1.97%	-2.86%	3.63%	-3.41%	-1.82%	2.87%	3.74%	5.97%	-12.31%	-0.85%	2.66%
3.0	17	-2.45%	-0.55%	-0.28%	-4.20%	1.34%	-2.04%	2.21%	0.78%	-0.84%	0.25%	0.45%	6.72%	0.00%
3.0	18	-1.34%	-0.74%	0.47%	-3.62%	0.86%	-1.74%	-5.02%	1.78%	0.00%	1.39%	0.48%	0.00%	0.00%
3.0	19	-1.36%	-0.74%	0.88%	-3.62%	2.54%	-1.74%	-5.05%	-2.54%	0.00%	3.19%	0.48%	0.00%	0.00%
3.0	20	-1.33%	-0.74%	1.15%	-2.14%	2.59%	-1.82%	2.26%	-2.59%	0.00%	3.48%	0.42%	0.00%	0.00%
3.0	21	-1.33%	-0.74%	0.42%	-2.85%	2.54%	-1.74%	1.79%	-2.59%	0.00%	5.96%	0.48%	0.00%	2.71%
3.0	22	0.00%	-0.74%	1.25%	-2.76%	2.31%	0.79%	1.44%	-3.37%	0.00%	5.94%	0.48%	0.00%	0.00%
3.0	23	-2.65%	-0.74%	1.25%	-2.85%	2.69%	0.79%	1.77%	-3.31%	0.00%	5.98%	-5.48%	0.00%	2.68%
3.0	24	-0.93%	-0.43%	1.25%	-2.72%	3.62%	2.12%	1.77%	1.38%	0.00%	5.99%	-5.43%	0.00%	2.68%
3.0	25	1.91%	2.13%	1.97%	-2.82%	3.63%	2.21%	1.79%	-0.41%	0.00%	5.96%	-5.43%	0.00%	0.00%

Table 31: Year by year summated return variable y and variable z. including transaction costs (continued)

# SD:	# MDA:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total:
2.6	18	-2.39%	-2.73%	-1.02%	-1.28%	-19.70%	8.24%	-0.74%	5.94%	0.78%	-1.17%	0.84%	2.38%	**-13.37%**
2.6	19	-2.34%	-2.51%	-1.58%	-1.46%	-21.38%	8.24%	0.23%	4.82%	0.78%	-0.94%	0.47%	2.34%	**-8.67%**
2.6	20	-0.99%	-2.51%	-1.81%	1.16%	-18.88%	8.24%	-0.74%	5.75%	0.78%	-0.57%	0.87%	4.12%	**4.12%**
2.6	21	-3.09%	-2.51%	-0.91%	1.16%	-11.29%	8.20%	1.00%	6.88%	1.32%	-0.86%	0.58%	3.23%	**14.67%**
2.6	22	-3.09%	-2.51%	-0.88%	1.16%	-6.13%	8.24%	-0.74%	6.88%	1.32%	-0.54%	0.84%	3.23%	**13.97%**
2.6	23	-3.09%	-2.51%	-2.34%	0.66%	-4.07%	8.24%	-0.88%	6.88%	3.74%	2.02%	1.22%	3.23%	**13.73%**
2.6	24	-3.09%	-2.25%	-0.97%	1.17%	-2.96%	5.16%	-2.49%	5.87%	3.74%	2.91%	0.51%	3.23%	**15.77%**
2.6	25	-3.09%	-2.25%	-0.97%	2.01%	-8.30%	5.16%	-2.49%	6.34%	2.03%	2.91%	0.51%	3.23%	**14.28%**
2.8	17	-2.38%	-1.57%	-4.30%	-4.16%	-12.27%	2.19%	-0.65%	0.40%	0.79%	-2.25%	-6.88%	2.32%	**-31.43%**
2.8	18	-2.39%	-1.57%	-0.56%	-3.50%	-12.27%	2.10%	0.49%	-6.89%	0.78%	-2.25%	-2.99%	2.30%	**-26.06%**
2.8	19	-1.18%	-2.74%	1.17%	-3.51%	-12.27%	2.10%	-0.76%	-2.48%	0.80%	-2.25%	-3.98%	2.07%	**-22.94%**
2.8	20	-3.11%	-2.74%	0.81%	-3.50%	-1.15%	2.19%	-0.74%	2.92%	0.78%	-0.95%	-3.98%	2.10%	**1.74%**
2.8	21	-3.12%	-2.74%	0.81%	-3.52%	-1.15%	2.13%	0.26%	2.97%	0.78%	-0.95%	-3.08%	2.07%	**-1.53%**
2.8	22	-3.11%	-1.36%	0.81%	1.13%	-1.15%	8.23%	-0.74%	2.92%	3.38%	-0.47%	-3.08%	2.07%	**26.76%**
2.8	23	-3.11%	-1.36%	1.37%	1.15%	-6.27%	5.50%	-0.72%	-6.66%	3.35%	-0.77%	-2.45%	2.10%	**3.87%**
2.8	24	-3.07%	-1.12%	-1.83%	1.15%	-5.13%	2.44%	-0.72%	5.09%	3.35%	-0.38%	1.62%	3.16%	**11.62%**
2.8	25	-3.09%	-1.12%	-0.88%	1.15%	-5.14%	2.35%	-0.72%	5.09%	2.18%	-0.09%	1.62%	3.25%	**5.34%**
3.0	17	-5.64%	-1.57%	0.83%	-0.55%	-4.84%	-0.61%	-0.26%	-1.04%	0.77%	-1.89%	-7.04%	0.23%	**-20.23%**
3.0	18	-4.45%	-1.57%	0.83%	-0.52%	-4.84%	2.13%	-0.26%	0.00%	0.77%	-2.47%	-7.04%	1.99%	**-22.92%**
3.0	19	-3.13%	-1.57%	0.00%	-0.52%	-4.76%	2.09%	0.39%	0.00%	0.77%	-2.13%	-7.65%	2.28%	**-22.18%**
3.0	20	-3.12%	-1.57%	0.00%	-3.50%	-1.15%	2.27%	-1.26%	0.63%	0.77%	-2.25%	-3.97%	2.30%	**-9.56%**
3.0	21	-3.12%	-1.57%	0.00%	-3.48%	-1.15%	2.12%	0.45%	2.09%	3.36%	-2.25%	-3.88%	2.07%	**-0.70%**
3.0	22	-3.12%	-1.57%	0.00%	-3.52%	-1.15%	-1.30%	0.45%	-2.49%	3.39%	-1.76%	-3.06%	2.07%	**-6.73%**
3.0	23	-3.12%	-1.33%	-0.94%	-3.48%	0.00%	-0.59%	0.24%	-3.52%	1.66%	-0.46%	-3.89%	3.80%	**-11.50%**
3.0	24	-3.11%	-1.33%	-0.94%	-3.32%	0.00%	-3.70%	0.29%	-5.37%	1.65%	-0.47%	-3.09%	3.80%	**-6.28%**
3.0	25	-1.87%	-1.12%	-0.94%	1.13%	0.00%	2.44%	0.24%	2.91%	1.65%	-0.45%	-3.09%	3.80%	**15.63%**

Table 32: Year by year summated return variable y and variable z. including transaction costs (continued)

Appendix IV: Year by year summated returns condition 1

Threshold level	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0.0	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.1	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.2	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.3	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.4	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.5	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.6	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.7	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.8	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
0.9	11.07%	5.31%	1.64%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.0	11.07%	5.31%	1.64%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.1	11.07%	5.31%	1.64%	-9.01%	12.71%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.2	11.07%	5.31%	1.64%	-8.57%	13.59%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.3	11.07%	5.31%	1.64%	-8.57%	11.84%	7.35%	-2.44%	16.05%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.4	11.07%	5.31%	1.80%	-7.73%	10.66%	7.35%	-2.44%	16.04%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.5	11.07%	5.31%	2.82%	-7.73%	5.75%	7.35%	-2.44%	16.04%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.6	11.07%	5.31%	2.82%	-7.73%	5.06%	7.35%	-2.44%	16.04%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.7	11.07%	5.31%	2.82%	-7.00%	4.77%	7.35%	-2.44%	16.04%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.8	11.07%	5.53%	3.81%	-7.00%	4.44%	6.11%	-2.03%	14.03%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1.9	11.07%	7.55%	3.81%	-7.00%	4.92%	6.11%	-2.03%	14.03%	16.85%	7.46%	-4.38%	-28.91%	10.56%
2.0	11.07%	7.55%	3.81%	-4.85%	4.46%	6.11%	-2.60%	14.03%	16.85%	7.46%	-4.38%	-28.91%	10.56%
2.1	11.07%	7.55%	3.90%	-4.85%	4.46%	3.98%	-6.22%	14.03%	16.85%	7.46%	-4.38%	-28.91%	9.02%
2.2	11.07%	7.55%	3.58%	-4.85%	3.50%	3.98%	-7.80%	13.10%	14.71%	7.46%	-4.38%	-28.91%	9.02%
2.3	11.07%	7.55%	3.01%	-3.50%	2.27%	7.68%	-3.01%	14.87%	14.71%	7.46%	-4.38%	-28.91%	9.02%
2.4	11.07%	7.55%	3.01%	-3.50%	1.07%	10.40%	-3.18%	14.87%	14.80%	7.46%	-4.38%	-28.91%	9.02%

Table 33: Year by year summated returns condition 1

Threshold level	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
0.0	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.1	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.2	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.3	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.4	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.5	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.6	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.7	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
0.8	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	8.87%	5.94%	2.69%	**108.27%**
0.9	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.35%	7.53%	8.87%	5.94%	2.69%	**107.74%**
1.0	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.35%	7.53%	8.87%	5.94%	2.69%	**107.74%**
1.1	6.47%	1.85%	2.54%	4.29%	-2.15%	12.89%	1.83%	4.15%	7.53%	8.87%	6.89%	2.69%	**103.91%**
1.2	6.47%	1.85%	2.54%	2.88%	-2.15%	12.89%	2.43%	4.15%	7.53%	8.87%	7.85%	2.69%	**105.38%**
1.3	4.94%	1.85%	2.54%	2.88%	-2.15%	12.89%	1.81%	4.40%	5.77%	8.87%	7.60%	2.69%	**97.94%**
1.4	4.94%	1.85%	2.54%	2.23%	-2.15%	12.89%	0.53%	4.40%	5.35%	10.66%	7.60%	2.69%	**97.19%**
1.5	4.64%	1.85%	3.27%	1.90%	-2.15%	12.89%	0.53%	4.40%	5.35%	10.66%	7.60%	2.69%	**93.39%**
1.6	4.64%	1.85%	3.43%	1.90%	-2.15%	12.89%	-0.06%	4.40%	3.30%	9.48%	7.79%	4.61%	**91.15%**
1.7	4.64%	1.85%	3.43%	1.90%	-2.15%	12.89%	0.78%	4.40%	1.26%	9.48%	7.79%	4.61%	**90.40%**
1.8	2.85%	1.85%	3.44%	1.90%	-2.15%	12.89%	2.17%	4.40%	2.35%	7.19%	7.68%	4.61%	**86.73%**
1.9	2.85%	1.85%	3.44%	1.90%	-2.15%	12.89%	2.17%	4.40%	2.35%	8.14%	7.13%	4.61%	**89.62%**
2.0	3.89%	1.85%	2.24%	1.90%	-2.15%	14.62%	2.17%	4.40%	4.13%	8.14%	7.13%	4.61%	**94.08%**
2.1	3.89%	1.85%	1.86%	1.90%	-2.15%	14.62%	2.17%	4.40%	3.60%	8.14%	5.66%	4.61%	**84.52%**
2.2	2.86%	1.85%	1.86%	1.90%	-2.15%	14.62%	1.41%	4.40%	3.60%	6.44%	5.66%	4.61%	**75.09%**
2.3	2.86%	1.85%	1.86%	1.90%	-2.15%	14.62%	1.41%	4.40%	3.60%	4.82%	5.66%	5.11%	**83.78%**
2.4	2.86%	1.85%	1.86%	1.90%	-2.15%	14.62%	1.41%	4.97%	3.60%	4.82%	5.66%	5.11%	**85.78%**

Table 34: Year by year summated returns condition 1 (continued)

Threshold level	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.5	11.07%	7.55%	4.24%	-3.50%	1.07%	9.64%	-3.18%	14.87%	14.80%	7.46%	-4.38%	-28.91%	9.02%
2.6	10.24%	7.55%	4.24%	-3.50%	1.07%	9.64%	-3.18%	14.87%	14.64%	7.46%	-4.38%	-28.91%	9.02%
2.7	10.24%	7.22%	4.24%	-3.50%	1.07%	9.64%	-2.84%	14.87%	14.64%	7.46%	-4.38%	-28.91%	9.02%
2.8	10.24%	7.19%	3.72%	-1.43%	0.00%	8.89%	-2.84%	14.87%	14.64%	4.81%	-4.38%	-28.91%	9.02%
2.9	8.26%	7.22%	3.72%	-1.43%	0.00%	5.32%	-2.28%	14.87%	14.64%	4.81%	-4.38%	-28.91%	9.02%
3.0	8.26%	7.22%	4.30%	-1.43%	0.00%	5.32%	-2.28%	14.87%	14.64%	4.81%	-4.38%	-28.91%	9.02%
3.1	8.26%	7.22%	4.30%	1.08%	0.00%	6.87%	-2.28%	16.58%	14.64%	4.81%	-4.38%	-26.71%	4.86%
3.2	8.33%	7.22%	4.30%	1.08%	0.00%	6.87%	-2.28%	16.58%	14.64%	4.81%	-4.38%	-25.29%	4.86%
3.3	8.33%	6.34%	4.30%	1.08%	0.00%	6.87%	-2.28%	16.58%	14.64%	4.81%	-4.38%	-25.29%	4.86%
3.4	8.33%	4.86%	4.30%	1.08%	0.00%	8.96%	-2.28%	16.58%	14.64%	4.81%	-4.38%	-25.29%	4.86%
3.5	8.44%	4.86%	4.30%	1.08%	0.00%	8.96%	-2.28%	16.58%	14.64%	4.81%	-4.38%	-25.29%	4.86%
3.6	8.44%	4.86%	4.30%	1.08%	0.00%	6.49%	-2.28%	16.58%	14.64%	4.81%	-4.38%	-25.29%	2.61%
3.7	8.32%	4.86%	1.71%	1.08%	0.00%	6.49%	-2.28%	16.58%	14.64%	4.81%	-4.38%	-25.29%	2.61%
3.8	8.32%	4.81%	1.20%	0.45%	0.00%	5.95%	-2.28%	12.09%	14.64%	4.81%	-2.19%	-25.29%	2.61%
3.9	8.32%	4.81%	1.20%	0.13%	0.00%	5.95%	-2.28%	12.09%	12.32%	4.81%	-2.19%	-25.29%	2.61%
4.0	8.32%	4.00%	1.20%	0.13%	0.00%	1.76%	-2.28%	10.70%	12.32%	4.81%	-3.04%	-25.29%	2.61%
4.1	8.32%	1.69%	1.20%	0.13%	0.00%	1.76%	-2.28%	12.41%	12.32%	4.81%	-3.04%	-25.29%	0.96%
4.2	8.32%	1.69%	1.20%	0.13%	0.00%	1.76%	2.13%	12.41%	12.32%	4.81%	-3.04%	-25.29%	0.96%
4.3	8.32%	1.69%	0.00%	0.13%	0.00%	1.76%	2.13%	12.41%	12.32%	4.81%	-3.04%	-25.29%	0.96%
4.4	8.32%	1.69%	0.00%	0.13%	0.00%	1.76%	2.13%	12.41%	12.32%	4.81%	-3.04%	-25.29%	0.96%
4.5	8.32%	1.69%	0.00%	-0.53%	0.00%	1.76%	2.13%	12.41%	13.53%	4.81%	-3.04%	-23.24%	0.96%
4.6	5.32%	1.69%	0.00%	-0.53%	0.00%	1.76%	2.13%	12.41%	13.53%	4.81%	-3.04%	-23.24%	0.96%
4.7	5.32%	0.00%	0.00%	-0.53%	0.00%	1.76%	3.94%	12.41%	13.61%	4.81%	-3.04%	-23.24%	0.96%
4.8	5.32%	0.00%	0.00%	-0.53%	0.00%	1.76%	3.94%	11.83%	9.14%	4.81%	-3.04%	-23.24%	0.96%
4.9	5.32%	0.00%	0.00%	-0.25%	0.00%	0.72%	3.94%	13.02%	9.14%	4.81%	-3.04%	-23.24%	-0.89%

Table 35: Year by year summated returns condition 1 (continued)

Threshold level	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
2.5	2.86%	1.85%	1.86%	1.90%	-2.15%	14.62%	1.41%	3.47%	3.60%	4.82%	5.66%	5.11%	**84.76%**
2.6	2.86%	1.85%	0.55%	1.90%	-2.15%	14.62%	1.41%	3.47%	3.60%	4.82%	5.87%	4.75%	**82.30%**
2.7	2.86%	0.71%	0.55%	1.90%	-2.15%	14.62%	1.41%	1.87%	3.60%	2.73%	5.87%	4.75%	**77.49%**
2.8	2.86%	0.71%	0.55%	1.90%	-2.15%	14.62%	1.41%	3.78%	3.60%	1.44%	7.51%	3.73%	**75.77%**
2.9	2.86%	2.49%	-0.65%	2.09%	-2.15%	17.65%	4.28%	3.78%	3.60%	1.44%	7.51%	5.22%	**78.99%**
3.0	2.86%	2.49%	-0.65%	2.09%	-2.15%	17.65%	4.28%	3.78%	4.61%	2.00%	7.51%	2.84%	**78.76%**
3.1	5.78%	2.49%	-0.65%	2.09%	-2.15%	15.06%	4.28%	3.78%	4.61%	2.00%	7.51%	2.84%	**82.88%**
3.2	5.78%	0.86%	-0.65%	2.09%	-2.15%	15.06%	4.28%	3.78%	4.61%	2.00%	7.51%	2.84%	**82.74%**
3.3	5.78%	0.86%	-0.65%	2.09%	-2.15%	15.06%	4.28%	3.83%	4.61%	2.00%	7.51%	2.84%	**81.91%**
3.4	5.78%	0.86%	-0.65%	2.09%	-2.15%	15.06%	4.28%	3.83%	4.61%	3.67%	7.51%	2.84%	**84.19%**
3.5	5.78%	0.86%	-0.65%	0.69%	-2.15%	15.06%	4.28%	3.83%	4.61%	3.67%	7.51%	3.29%	**83.36%**
3.6	5.78%	0.86%	-0.65%	0.69%	-2.15%	15.06%	4.20%	3.83%	2.62%	1.38%	10.18%	1.63%	**75.27%**
3.7	5.78%	0.86%	-0.65%	0.69%	-2.15%	13.89%	4.20%	5.07%	3.15%	1.38%	10.18%	2.58%	**74.11%**
3.8	3.58%	-0.26%	-0.65%	0.69%	-2.15%	11.20%	4.66%	5.07%	4.06%	1.38%	8.48%	2.58%	**63.74%**
3.9	3.58%	-0.26%	-0.65%	0.69%	-2.15%	11.20%	4.66%	5.07%	4.06%	1.38%	8.48%	2.58%	**61.09%**
4.0	3.58%	-0.26%	-0.65%	2.66%	-2.15%	10.24%	2.04%	5.07%	4.06%	1.38%	7.15%	2.58%	**50.92%**
4.1	3.58%	-0.26%	-0.65%	2.66%	-2.15%	10.24%	2.04%	5.07%	2.62%	1.38%	7.15%	2.58%	**47.23%**
4.2	3.58%	-0.26%	-0.65%	2.66%	-2.15%	10.24%	2.04%	5.07%	2.62%	0.87%	7.15%	2.58%	**51.12%**
4.3	3.58%	-0.26%	-0.65%	2.66%	-2.15%	10.24%	2.04%	5.07%	2.62%	0.87%	7.15%	2.58%	**49.92%**
4.4	3.58%	-0.26%	-0.65%	2.66%	-2.15%	7.52%	5.29%	5.07%	5.08%	0.87%	7.15%	2.58%	**52.91%**
4.5	3.58%	-0.26%	-0.65%	3.40%	-2.15%	3.04%	5.29%	5.07%	4.57%	0.87%	7.15%	0.95%	**49.64%**
4.6	3.58%	-0.26%	-0.65%	3.40%	-2.15%	4.65%	5.29%	5.07%	4.57%	0.87%	7.15%	0.95%	**48.25%**
4.7	3.58%	-0.32%	-0.65%	3.40%	-2.15%	1.44%	5.29%	5.07%	4.57%	0.40%	6.05%	0.95%	**43.63%**
4.8	3.58%	-0.32%	-0.65%	3.40%	-2.15%	1.44%	5.29%	5.07%	4.57%	0.40%	6.05%	0.98%	**38.61%**
4.9	3.58%	-0.83%	-0.65%	3.40%	-2.15%	1.44%	5.29%	7.25%	4.57%	0.00%	6.05%	0.98%	**38.48%**

Table 36: Year by year summated returns condition 1 (continued)

Threshold level	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
5.0	5.32%	0.00%	0.00%	-0.25%	0.00%	0.72%	3.94%	13.02%	9.14%	4.81%	-3.04%	-23.24%	-0.89%
5.1	5.32%	0.00%	0.00%	-0.25%	0.00%	0.72%	3.94%	13.02%	7.80%	3.24%	-3.04%	-23.24%	-0.89%
5.2	5.32%	0.00%	0.00%	-0.25%	0.00%	0.72%	3.94%	13.02%	7.80%	3.24%	-3.04%	-21.84%	-0.89%
5.3	5.32%	0.00%	0.00%	-0.25%	0.00%	0.72%	3.94%	13.02%	7.80%	3.83%	-3.04%	-21.84%	-0.89%
5.4	-0.64%	0.00%	0.00%	1.28%	0.00%	0.72%	3.94%	13.02%	7.80%	3.83%	-3.04%	-21.84%	-0.89%
5.5	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	3.94%	13.02%	7.80%	3.83%	-0.39%	-21.84%	-0.89%
5.6	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	3.94%	13.02%	7.80%	3.83%	-0.39%	-21.84%	-0.89%
5.7	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.80%	13.02%	7.80%	2.51%	-0.39%	-19.46%	-0.89%
5.8	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.80%	13.02%	7.80%	2.51%	-0.39%	-19.46%	-0.89%
5.9	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.80%	13.02%	7.80%	2.51%	-0.39%	-19.46%	-0.89%
6.0	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.62%	13.02%	7.80%	2.51%	-0.39%	-19.46%	-0.89%
6.1	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.62%	13.02%	7.80%	2.51%	-0.39%	-19.46%	-0.89%
6.2	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.62%	13.02%	7.80%	2.51%	-0.39%	-17.08%	-0.89%
6.3	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.62%	13.02%	7.80%	2.51%	-0.39%	-17.08%	-0.89%
6.4	-0.64%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.62%	13.02%	7.80%	8.84%	-0.39%	-17.08%	-0.89%
6.5	0.00%	0.00%	0.00%	-0.33%	0.00%	0.72%	0.62%	13.02%	7.80%	8.84%	-0.39%	-17.08%	-0.89%
6.6	0.00%	0.00%	0.00%	0.00%	0.00%	0.72%	0.62%	13.02%	7.80%	8.84%	-0.39%	-17.08%	-0.89%
6.7	0.00%	0.00%	0.00%	0.00%	0.00%	0.72%	0.62%	13.02%	7.22%	8.84%	-0.39%	-17.08%	-0.89%
6.8	0.00%	0.00%	0.00%	0.00%	0.00%	0.72%	0.62%	13.02%	7.22%	8.84%	-0.39%	-17.08%	-0.89%
6.9	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	0.62%	13.02%	7.22%	8.84%	-0.39%	-17.08%	-0.89%
7.0	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	0.62%	13.02%	7.22%	8.84%	-0.39%	-17.08%	-0.89%
7.1	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	0.62%	13.02%	7.22%	8.84%	-0.39%	-17.08%	-0.89%
7.2	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.47%	13.02%	7.22%	9.68%	-0.39%	-16.57%	-0.89%
7.3	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.47%	10.56%	7.22%	9.68%	-0.39%	-16.57%	-0.89%
7.4	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.47%	10.56%	7.22%	9.68%	-0.39%	-16.57%	-3.99%

Table 37: Year by year summated returns condition 1 (continued)

Threshold level	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
5.0	3.58%	-0.83%	0.02%	3.40%	-2.15%	1.44%	5.29%	7.25%	4.57%	0.00%	6.05%	0.98%	**39.15%**
5.1	3.58%	-0.83%	0.02%	3.40%	-2.15%	1.44%	5.29%	7.25%	4.57%	0.00%	6.05%	0.98%	**36.24%**
5.2	1.97%	-0.83%	0.02%	3.40%	-2.15%	2.18%	5.29%	8.66%	4.57%	0.00%	6.05%	0.98%	**38.18%**
5.3	1.97%	-0.46%	0.02%	3.40%	-2.15%	2.18%	5.29%	8.66%	4.57%	0.00%	6.05%	0.98%	**39.13%**
5.4	2.87%	-0.46%	0.02%	3.40%	-2.15%	2.18%	5.29%	8.66%	4.57%	0.00%	3.50%	-0.88%	**31.19%**
5.5	-0.25%	-0.46%	0.02%	3.40%	-2.15%	2.18%	7.99%	8.66%	4.57%	0.00%	3.50%	-0.88%	**31.81%**
5.6	-0.25%	0.00%	0.02%	3.40%	-2.15%	2.18%	7.99%	6.59%	4.57%	0.00%	3.50%	-0.88%	**30.21%**
5.7	-0.25%	0.00%	0.02%	3.40%	1.16%	2.18%	7.99%	6.59%	4.57%	0.00%	3.50%	-0.88%	**31.44%**
5.8	-0.25%	0.00%	0.02%	3.40%	1.16%	2.18%	7.99%	6.59%	4.57%	0.00%	3.50%	-0.88%	**31.44%**
5.9	-0.25%	0.00%	0.02%	3.40%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**31.42%**
6.0	-0.25%	0.00%	0.02%	3.40%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**31.24%**
6.1	-1.00%	0.00%	0.02%	3.40%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**30.48%**
6.2	-1.00%	0.00%	0.02%	7.67%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**37.13%**
6.3	0.00%	0.00%	0.02%	7.67%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**38.13%**
6.4	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**41.57%**
6.5	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**42.20%**
6.6	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**42.53%**
6.7	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**41.95%**
6.8	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**41.95%**
6.9	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**43.36%**
7.0	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**43.36%**
7.1	0.00%	0.00%	0.02%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**43.36%**
7.2	0.00%	0.00%	0.00%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**46.54%**
7.3	0.00%	0.00%	0.00%	4.76%	1.16%	2.18%	7.99%	6.58%	4.57%	0.00%	3.50%	-0.88%	**44.08%**
7.4	0.00%	0.00%	0.00%	4.76%	1.16%	2.18%	6.06%	6.58%	4.57%	0.00%	3.50%	-0.88%	**39.05%**

Table 38: Year by year summated returns condition 1 (continued)

Threshold level	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
7.5	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.47%	10.56%	7.22%	9.68%	-0.39%	-16.57%	-3.99%
7.6	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	9.68%	-0.39%	-13.19%	-3.99%
7.7	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	12.03%	-0.39%	-13.19%	-3.99%
7.8	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	11.29%	-0.39%	-12.55%	-3.99%
7.9	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	11.29%	-0.39%	-12.55%	-3.99%
8.0	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	8.99%	1.90%	-12.55%	-3.99%
8.1	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	8.99%	1.90%	-14.14%	-3.99%
8.2	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	8.99%	1.90%	-14.14%	-3.99%
8.3	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	3.76%	8.99%	1.90%	-14.14%	-3.99%
8.4	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	2.30%	10.56%	1.45%	8.99%	1.90%	-9.77%	-3.99%
8.5	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	0.00%	10.56%	0.00%	4.17%	0.51%	-9.77%	-3.99%
8.6	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	0.00%	10.56%	0.00%	4.17%	0.51%	-9.77%	-3.99%
8.7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	4.17%	0.51%	-9.77%	-3.99%
8.8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	4.17%	0.51%	-9.77%	-3.99%
8.9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	4.17%	0.51%	-9.77%	-3.99%
9.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	3.06%	0.51%	-9.77%	-3.99%
9.1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	3.06%	0.51%	-9.77%	-0.50%
9.2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	0.41%	0.51%	-9.77%	-0.50%
9.3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	0.41%	0.51%	-9.77%	-0.50%
9.4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	0.41%	0.51%	-9.77%	-0.50%
9.5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	0.41%	0.51%	-9.77%	-0.50%
9.6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	-0.32%	0.51%	-9.77%	-0.50%
9.7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	-0.32%	0.51%	-9.77%	-0.50%
9.8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.56%	0.00%	-0.32%	0.51%	-9.77%	-0.50%
9.9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	9.57%	0.00%	-0.32%	0.51%	-9.77%	-0.50%
10.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	9.57%	0.00%	-0.32%	0.51%	-9.77%	-0.50%

Table 39: Year by year summated returns condition 1 (continued)

Threshold level	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
7.5	0.00%	0.00%	0.00%	4.76%	1.16%	2.18%	6.06%	6.58%	4.57%	0.00%	3.50%	-0.88%	**39.05%**
7.6	0.00%	0.00%	0.00%	4.76%	1.16%	2.18%	6.06%	6.58%	4.57%	0.00%	3.50%	-0.88%	**38.81%**
7.7	0.00%	0.00%	0.00%	4.76%	1.16%	2.18%	6.06%	6.58%	4.48%	0.00%	3.50%	-0.88%	**41.06%**
7.8	0.00%	0.00%	0.00%	4.76%	1.16%	-3.00%	2.77%	11.02%	4.48%	0.00%	3.50%	-0.88%	**36.94%**
7.9	0.00%	0.00%	0.00%	4.76%	1.16%	-3.00%	2.77%	11.02%	4.48%	0.00%	0.00%	-0.88%	**33.44%**
8.0	0.00%	0.00%	0.00%	4.76%	1.16%	-3.00%	2.77%	11.02%	2.46%	0.00%	0.00%	-0.88%	**31.41%**
8.1	0.00%	0.00%	0.00%	4.76%	1.16%	-3.00%	2.77%	11.02%	2.46%	0.00%	0.00%	-0.88%	**29.82%**
8.2	0.00%	0.00%	0.00%	4.76%	0.94%	-3.00%	2.77%	11.02%	2.46%	0.00%	0.00%	-0.88%	**29.60%**
8.3	0.00%	0.00%	0.00%	4.76%	0.94%	-3.00%	2.77%	11.02%	2.46%	0.00%	0.00%	-0.88%	**29.60%**
8.4	0.00%	0.00%	0.00%	4.76%	0.94%	-3.00%	2.77%	11.02%	0.00%	0.00%	0.00%	-0.88%	**29.20%**
8.5	0.00%	0.00%	0.00%	4.76%	0.94%	-3.00%	4.34%	11.02%	0.00%	0.00%	0.00%	-0.88%	**20.81%**
8.6	0.00%	0.00%	0.00%	4.76%	0.94%	-3.00%	4.34%	11.02%	0.00%	0.00%	0.00%	-0.88%	**20.81%**
8.7	0.00%	0.00%	0.00%	2.55%	0.94%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.88%	**12.42%**
8.8	0.00%	0.00%	0.00%	2.55%	0.94%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.88%	**12.42%**
8.9	0.00%	0.00%	0.00%	2.55%	0.94%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.88%	**12.42%**
9.0	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.01%	**8.53%**
9.1	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.01%	**12.02%**
9.2	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.01%	**9.38%**
9.3	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.01%	**9.38%**
9.4	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	-0.01%	**9.38%**
9.5	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	0.00%	**9.39%**
9.6	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	0.00%	**8.66%**
9.7	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	0.00%	**8.66%**
9.8	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	0.00%	**8.66%**
9.9	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	0.00%	**7.67%**
10.0	0.00%	0.00%	0.00%	2.55%	-2.71%	-3.00%	0.30%	11.02%	0.00%	0.00%	0.00%	0.00%	**7.67%**

Table 40: Year by year summated returns condition 1 (continued)

Appendix V: Year by year summated returns condition 2

# Days look back period:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1	8.08%	5.53%	1.87%	-5.84%	12.27%	7.35%	-1.69%	19.60%	16.85%	7.46%	-4.38%	-19.73%	10.56%
2	8.26%	5.53%	2.15%	-2.25%	10.61%	4.19%	-4.83%	16.11%	13.88%	3.94%	-1.73%	-19.73%	14.05%
3	8.26%	3.83%	0.44%	-2.60%	9.36%	2.56%	-7.13%	12.00%	10.41%	9.76%	-1.69%	-6.59%	9.89%
4	8.13%	3.87%	1.43%	-1.09%	9.84%	2.01%	-2.89%	11.39%	5.95%	8.19%	-2.20%	-7.04%	6.79%

Table 41: Year by year summated returns condition 2

# Days look back period:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
0	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
1	6.47%	1.85%	3.21%	4.29%	1.16%	15.03%	3.36%	5.65%	3.04%	9.45%	5.94%	2.70%	**120.08%**
2	6.47%	2.26%	4.56%	-0.26%	-6.27%	12.65%	1.84%	4.63%	9.49%	9.02%	4.47%	3.57%	**102.61%**
3	2.57%	2.63%	3.36%	-0.26%	1.52%	15.34%	4.55%	-1.46%	6.28%	9.34%	6.51%	3.97%	**102.85%**
4	6.49%	1.50%	2.16%	-1.67%	1.52%	17.09%	3.42%	6.31%	2.49%	6.78%	3.35%	2.11%	**95.95%**

Table 42: Year by year summated returns condition 2 (continued)

Appendix VI: Year by year summated returns condition 3

# Days look back period:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
1	8.08%	5.53%	1.87%	-5.84%	12.27%	7.35%	-1.69%	19.60%	16.85%	7.46%	-4.38%	-19.73%	10.56%
2	8.26%	3.45%	-0.30%	-3.21%	5.12%	5.21%	-4.99%	7.01%	6.57%	5.34%	-1.69%	-3.79%	12.71%
3	0.20%	0.04%	-0.51%	-0.07%	2.46%	5.15%	0.01%	2.73%	5.77%	1.32%	-2.20%	-5.86%	1.53%
4	-0.64%	0.00%	-0.34%	-0.73%	0.46%	2.00%	0.57%	1.79%	0.00%	1.32%	0.00%	0.00%	0.00%

Table 43: Year by year summated returns condition 3

# Days look back period:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
0	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
1	6.47%	1.85%	3.21%	4.29%	1.16%	15.03%	3.36%	5.65%	3.04%	9.45%	5.94%	2.70%	**120.08%**
2	2.30%	1.12%	2.05%	-5.03%	8.00%	14.39%	-2.88%	-1.32%	2.93%	5.72%	6.22%	2.09%	**75.27%**
3	-2.95%	2.76%	-0.73%	-0.40%	0.00%	1.39%	4.56%	0.30%	0.53%	2.11%	4.26%	0.64%	**23.04%**
4	-1.04%	0.00%	-0.73%	-0.74%	0.00%	0.00%	-1.39%	0.30%	0.53%	1.63%	0.00%	1.51%	**4.50%**

Table 44: Year by year summated returns condition 3 (continued)

Appendix VII: Year by year summated returns condition 4

Multiple positions allowed?	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Yes	11.07%	5.31%	1.87%	-9.00%	14.45%	7.35%	-2.44%	17.84%	16.85%	7.46%	-4.38%	-28.91%	10.56%
No	11.19%	1.52%	3.54%	-7.02%	14.35%	3.78%	-2.44%	10.79%	14.71%	4.41%	-4.38%	-32.26%	10.56%

Table 45: Year by year summated returns condition 4

Multiple positions allowed?	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
Yes	6.47%	1.85%	3.17%	3.96%	-2.15%	12.89%	3.36%	5.65%	7.53%	9.45%	5.94%	2.69%	**108.85%**
No	6.47%	2.14%	2.58%	0.41%	-5.81%	16.49%	4.20%	5.70%	5.39%	9.30%	5.94%	3.08%	**84.67%**

Table 46: Year by year summated returns condition 4 (continued)

Appendix VIII: Year by year geometric return buy and sell method 1

Method 1	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1 day	4.06%	0.92%	2.01%	-3.11%	3.85%	5.33%	1.85%	13.23%	14.55%	9.35%	6.38%	-8.71%	10.77%
2 days	4.00%	4.61%	4.05%	-4.23%	7.19%	3.53%	-4.02%	21.73%	13.32%	8.73%	-1.40%	-11.38%	10.05%
3 days	8.26%	6.14%	1.82%	-3.60%	12.91%	7.25%	-1.71%	20.98%	18.06%	7.59%	-4.63%	-17.20%	11.90%
4 days	9.16%	5.36%	-0.69%	-3.11%	14.89%	15.66%	-2.96%	28.22%	21.76%	5.65%	-8.84%	-16.62%	12.07%
5 days	9.79%	6.05%	0.71%	-5.00%	17.79%	23.79%	-0.27%	20.81%	22.67%	-4.52%	-15.96%	-11.07%	13.12%
6 days	11.70%	7.76%	-0.47%	-7.29%	20.96%	23.23%	5.95%	18.40%	25.76%	-8.33%	-15.55%	-6.41%	13.09%
7 days	11.96%	6.53%	0.03%	-8.23%	21.65%	26.88%	10.07%	17.53%	23.59%	-8.27%	-13.65%	-7.65%	9.43%

Table 47: Year by year geometric return buy and sell method 1

Method 1	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
1 day	3.09%	0.86%	2.30%	4.09%	2.13%	8.90%	1.74%	10.59%	3.78%	5.10%	5.61%	-1.53%	**107.14%**
2 days	5.12%	1.89%	2.88%	3.70%	7.24%	9.35%	3.22%	11.04%	2.59%	2.83%	5.63%	-2.07%	**109.59%**
3 days	7.02%	1.83%	3.20%	3.08%	5.11%	14.75%	3.16%	5.25%	2.86%	8.94%	4.39%	0.97%	**128.35%**
4 days	6.08%	3.95%	5.11%	0.60%	3.11%	17.18%	-2.44%	1.79%	4.49%	9.93%	6.92%	1.09%	**138.37%**
5 days	8.26%	3.19%	3.47%	2.41%	6.03%	18.09%	-4.41%	2.96%	0.87%	12.83%	4.87%	-1.36%	**135.10%**
6 days	8.05%	2.79%	4.84%	-0.80%	1.85%	28.91%	-6.07%	6.07%	-3.02%	15.05%	0.71%	-8.51%	**138.66%**
7 days	5.80%	4.70%	6.96%	-1.19%	3.89%	38.10%	-6.47%	6.35%	-1.49%	16.04%	-1.91%	-10.73%	**149.91%**

Table 48: Year by year geometric return buy and sell method 1 (continued)

Appendix IX: Year by year geometric return buy and sell method 2

Method 2	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.0% & -1.0%	-0.47%	1.14%	0.21%	-5.84%	20.22%	6.64%	6.15%	18.56%	19.67%	12.97%	0.91%	-8.62%	7.15%
2.5% & -1.0%	1.50%	3.66%	3.71%	-7.26%	24.36%	12.00%	6.62%	10.46%	26.93%	11.20%	2.91%	-7.26%	10.35%
3.0% & -1.0%	-0.53%	2.08%	7.32%	-5.89%	32.51%	4.39%	10.33%	7.13%	29.35%	7.32%	0.85%	-9.56%	13.63%
3.5% & -1.0%	0.93%	4.08%	11.03%	-12.66%	41.15%	8.00%	9.17%	-2.58%	19.36%	1.55%	2.34%	-8.68%	11.89%
4.0% & -1.0%	2.40%	6.12%	9.31%	-12.24%	50.31%	11.72%	6.96%	-0.19%	18.08%	-0.98%	-5.95%	-7.79%	14.63%
4.5% & -1.0%	3.89%	8.18%	12.52%	-11.81%	60.02%	15.55%	9.56%	2.24%	15.67%	-4.39%	-5.49%	-6.90%	17.42%
5.0% & -1.0%	5.40%	10.27%	9.16%	-11.39%	70.30%	19.49%	12.22%	4.71%	12.22%	-13.81%	-5.04%	-6.00%	20.26%
5.5% & -1.0%	6.92%	-1.07%	11.79%	-10.97%	81.19%	23.54%	14.93%	7.24%	1.16%	-13.40%	-4.59%	-5.10%	15.55%
6.0% & -1.0%	1.26%	-6.75%	6.89%	-10.54%	92.71%	19.25%	9.89%	9.82%	2.61%	-12.99%	-4.13%	-4.19%	17.76%
2.0% & -1.5%	4.07%	-1.39%	6.88%	-9.59%	22.62%	6.58%	3.49%	16.18%	23.31%	10.69%	-1.12%	-13.14%	6.06%
2.5% & -1.5%	7.18%	1.06%	12.26%	-11.86%	26.82%	12.49%	3.42%	6.06%	31.44%	7.86%	0.84%	-11.86%	9.23%
3.0% & -1.5%	5.53%	-0.99%	17.88%	-10.55%	35.79%	13.50%	7.02%	1.82%	33.91%	3.04%	-1.68%	-14.48%	12.48%
3.5% & -1.5%	8.13%	0.96%	23.75%	-17.83%	45.36%	19.15%	5.35%	-8.81%	22.29%	-3.48%	-0.23%	-13.64%	10.19%
4.0% & -1.5%	10.77%	2.93%	22.99%	-17.43%	55.54%	25.06%	2.70%	-6.58%	20.95%	-6.37%	-9.23%	-12.80%	12.89%
4.5% & -1.5%	13.47%	4.93%	28.43%	-17.03%	66.38%	31.22%	5.20%	-4.30%	18.46%	-10.05%	-8.80%	-11.96%	15.64%
5.0% & -1.5%	16.22%	6.96%	25.76%	-16.63%	77.92%	37.66%	7.75%	-1.98%	7.75%	-19.73%	-8.36%	-11.11%	18.44%
5.5% & -1.5%	19.03%	-5.02%	30.65%	-16.24%	90.21%	44.38%	10.35%	0.38%	-3.86%	-19.35%	-7.92%	-10.26%	13.23%
6.0% & -1.5%	21.89%	-4.11%	26.07%	-15.84%	103.27%	40.65%	4.97%	2.79%	-2.48%	-18.96%	-7.48%	-9.40%	15.39%
2.0% & -2.0%	-1.54%	-3.88%	8.46%	-6.43%	31.53%	3.36%	0.88%	13.83%	23.31%	12.90%	-3.12%	-14.09%	9.29%
2.5% & -2.0%	0.90%	-1.49%	14.47%	-8.35%	36.67%	9.10%	0.30%	1.81%	31.44%	9.43%	-1.20%	-12.39%	8.12%
3.0% & -2.0%	3.40%	-3.98%	20.79%	-6.08%	47.78%	9.51%	3.79%	-3.25%	40.05%	9.31%	-4.16%	-15.01%	11.34%

Table 49: Year by year geometric return buy and sell method 2

Method 2	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
2.0% & -1.0%	4.46%	2.55%	9.14%	-0.02%	2.32%	9.88%	3.73%	6.88%	3.49%	3.49%	4.93%	-5.41%	**124.15%**
2.5% & -1.0%	0.83%	1.50%	9.62%	-0.56%	4.35%	12.00%	8.94%	5.21%	4.46%	8.16%	-1.22%	-12.26%	**140.22%**
3.0% & -1.0%	-0.71%	3.50%	13.43%	1.90%	6.41%	17.61%	5.65%	9.94%	0.32%	13.03%	-2.25%	-20.97%	**146.76%**
3.5% & -1.0%	-3.18%	0.93%	12.23%	-4.51%	8.50%	23.47%	5.05%	14.85%	3.29%	12.93%	0.16%	-20.97%	**138.31%**
4.0% & -1.0%	-6.50%	2.40%	15.54%	-3.11%	10.62%	29.58%	8.67%	14.18%	6.33%	11.72%	2.61%	-20.97%	**163.42%**
4.5% & -1.0%	-5.60%	3.89%	18.92%	-1.70%	6.81%	35.98%	12.39%	6.45%	3.66%	15.55%	5.11%	-20.97%	**196.94%**
5.0% & -1.0%	-10.16%	-0.65%	-3.36%	-0.28%	8.36%	26.76%	16.22%	9.56%	-5.65%	12.63%	7.66%	-20.97%	**167.90%**
5.5% & -1.0%	-9.73%	0.30%	-2.43%	1.16%	9.92%	23.54%	20.17%	12.74%	-4.29%	15.90%	3.44%	-20.97%	**176.92%**
6.0% & -1.0%	-9.30%	1.26%	-1.50%	-4.19%	11.49%	19.25%	24.23%	1.13%	-2.92%	19.25%	5.42%	-20.97%	**164.71%**
2.0% & -1.5%	9.23%	0.49%	7.48%	-3.51%	0.77%	6.58%	-0.91%	2.62%	-0.63%	6.58%	1.27%	-7.36%	**97.27%**
2.5% & -1.5%	5.40%	-1.05%	7.41%	-0.63%	2.77%	8.09%	4.07%	0.00%	-0.21%	12.49%	-6.12%	-11.49%	**115.69%**
3.0% & -1.5%	4.28%	0.90%	11.15%	2.32%	4.80%	13.50%	-0.09%	4.49%	-0.79%	18.70%	-7.56%	-20.71%	**134.26%**
3.5% & -1.5%	2.16%	-2.10%	14.99%	-9.24%	6.86%	19.15%	-1.17%	9.16%	2.65%	19.15%	-5.29%	-27.51%	**119.99%**
4.0% & -1.5%	-0.90%	-0.67%	18.95%	-7.91%	8.94%	25.06%	2.24%	7.97%	6.18%	18.42%	-2.97%	-27.51%	**149.21%**
4.5% & -1.5%	1.03%	0.77%	23.03%	-6.58%	4.66%	31.22%	5.74%	-0.35%	3.49%	23.66%	-0.61%	-27.51%	**190.16%**
5.0% & -1.5%	-9.41%	-4.12%	-1.57%	-5.22%	6.18%	21.09%	9.35%	2.55%	-6.31%	21.09%	1.80%	-27.51%	**148.56%**
5.5% & -1.5%	-8.54%	-3.20%	-0.15%	-3.86%	7.71%	17.42%	13.06%	5.53%	-4.51%	25.80%	-2.68%	-27.51%	**164.63%**
6.0% & -1.5%	-7.67%	-2.28%	1.28%	-9.40%	9.25%	21.38%	16.88%	-6.30%	-2.68%	30.66%	-0.82%	-27.51%	**179.55%**
2.0% & -2.0%	7.57%	2.49%	10.19%	-3.09%	-0.76%	7.60%	2.55%	2.55%	-4.61%	12.01%	-2.29%	-8.37%	**100.33%**
2.5% & -2.0%	2.74%	0.90%	10.09%	0.30%	1.21%	9.10%	8.77%	-0.60%	-4.70%	19.39%	-10.79%	-12.91%	**112.31%**
3.0% & -2.0%	1.13%	3.40%	14.47%	-1.27%	3.20%	15.12%	4.37%	4.37%	-5.73%	27.21%	-12.61%	-22.80%	**144.35%**

Table 50: Year by year geometric return buy and sell method 2 (continued)

Method 2	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
3.5% & -2.0%	5.94%	-2.09%	27.42%	-13.76%	59.73%	14.97%	1.65%	-4.78%	26.57%	2.34%	-2.75%	-18.36%	8.52%
4.0% & -2.0%	8.53%	-0.18%	19.27%	-12.50%	72.58%	20.66%	-1.41%	-1.50%	25.15%	-6.04%	-12.42%	-17.57%	11.17%
4.5% & -2.0%	11.18%	1.76%	24.56%	-11.23%	86.40%	26.61%	0.99%	1.87%	22.53%	-3.75%	-12.00%	-16.77%	13.88%
5.0% & -2.0%	13.87%	3.73%	21.34%	-9.94%	101.25%	32.83%	3.43%	5.35%	10.85%	-14.17%	-11.58%	-15.97%	16.64%
5.5% & -2.0%	16.62%	5.73%	26.06%	-8.65%	117.20%	39.31%	5.93%	8.92%	-1.63%	-12.93%	-11.15%	-15.16%	10.93%
6.0% & -2.0%	19.42%	7.75%	21.02%	-7.34%	134.33%	35.02%	0.26%	12.60%	0.26%	-18.37%	-10.73%	-14.35%	13.06%
2.0% & -2.5%	5.60%	-6.32%	21.71%	-5.55%	31.53%	0.23%	2.88%	11.51%	23.31%	11.17%	-5.09%	-17.97%	8.73%
2.5% & -2.5%	9.29%	-3.99%	30.37%	-7.51%	42.97%	5.79%	2.26%	-2.28%	31.44%	6.65%	-3.21%	-16.34%	7.02%
3.0% & -2.5%	7.03%	-6.89%	39.60%	-4.76%	55.35%	11.63%	6.34%	2.61%	40.05%	5.99%	-6.59%	-14.69%	10.20%
3.5% & -2.5%	3.79%	-5.06%	49.43%	-13.02%	68.73%	17.76%	10.55%	1.45%	40.51%	-1.78%	-5.21%	-18.08%	13.46%
4.0% & -2.5%	6.33%	-3.21%	40.46%	-11.32%	83.19%	24.19%	7.71%	5.96%	48.90%	-10.74%	-15.51%	-16.88%	16.80%
4.5% & -2.5%	8.92%	-1.33%	48.82%	-9.59%	98.81%	30.95%	11.40%	10.66%	47.15%	-8.57%	-15.11%	-15.67%	20.22%
5.0% & -2.5%	11.56%	0.58%	26.10%	-7.84%	115.68%	38.03%	15.20%	15.53%	33.67%	-19.30%	-14.70%	-14.45%	23.73%
5.5% & -2.5%	14.25%	2.52%	21.61%	-6.07%	133.88%	45.46%	19.10%	20.60%	19.10%	-18.14%	-14.29%	-13.22%	17.63%
6.0% & -2.5%	16.99%	4.48%	16.15%	-4.27%	153.53%	40.92%	13.22%	25.86%	23.13%	-23.65%	-13.88%	-11.97%	20.46%
2.0% & -3.0%	9.92%	-3.98%	21.09%	-8.42%	31.53%	-2.83%	5.99%	14.89%	23.31%	9.46%	-7.03%	-17.64%	8.17%
2.5% & -3.0%	14.33%	-1.11%	29.70%	-10.79%	42.97%	2.56%	5.33%	4.74%	31.44%	3.94%	-5.18%	-15.59%	5.92%
3.0% & -3.0%	11.93%	-4.12%	38.88%	-8.14%	55.35%	8.22%	10.06%	11.06%	40.05%	2.76%	-8.97%	-13.51%	9.07%
3.5% & -3.0%	1.67%	-1.76%	48.66%	-16.96%	68.73%	14.17%	14.98%	10.31%	39.78%	-5.75%	-7.63%	-16.96%	12.30%
4.0% & -3.0%	4.16%	0.64%	38.31%	-15.34%	83.19%	20.41%	11.99%	16.34%	48.14%	-15.23%	-18.51%	-15.34%	15.60%
4.5% & -3.0%	6.69%	3.09%	46.53%	-13.70%	98.81%	26.95%	16.38%	22.67%	45.64%	-13.17%	-18.12%	-19.91%	18.99%
5.0% & -3.0%	9.28%	5.59%	22.25%	-12.03%	115.68%	33.82%	20.93%	29.31%	30.94%	-17.87%	-17.73%	-18.75%	22.46%
5.5% & -3.0%	11.91%	8.14%	17.29%	-10.33%	133.88%	41.03%	25.63%	36.27%	15.47%	-16.28%	-17.33%	-17.58%	15.82%
6.0% & -3.0%	14.60%	10.73%	11.45%	-8.62%	153.53%	35.92%	19.37%	43.57%	19.37%	-21.95%	-16.94%	-16.40%	18.60%

Table 51: Year by year geometric return buy and sell method 2 (continued)

Method 2	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
3.5% & -2.0%	4.12%	0.29%	19.01%	-13.76%	5.23%	21.44%	3.73%	9.57%	-2.47%	28.28%	-10.47%	-29.80%	140.58%
4.0% & -2.0%	0.98%	2.25%	16.55%	-12.50%	7.29%	28.08%	8.34%	8.34%	0.89%	28.08%	-8.27%	-29.46%	156.31%
4.5% & -2.0%	3.44%	4.24%	20.54%	-11.23%	2.54%	35.04%	13.14%	-6.76%	-2.16%	35.04%	-6.04%	-29.12%	204.71%
5.0% & -2.0%	-7.75%	-0.85%	-5.51%	-9.94%	4.03%	23.94%	18.12%	-4.04%	-12.33%	42.35%	-3.76%	-28.78%	173.11%
5.5% & -2.0%	-6.42%	0.57%	-4.15%	-8.65%	5.53%	20.14%	23.30%	-1.25%	-10.65%	50.01%	-8.47%	-28.44%	212.71%
6.0% & -2.0%	-5.08%	2.02%	-2.77%	-14.35%	7.04%	24.79%	28.68%	-13.21%	-8.93%	58.05%	-6.72%	-28.10%	234.33%
2.0% & -2.5%	5.92%	5.60%	19.40%	2.88%	-2.28%	4.87%	-1.07%	-1.07%	-8.45%	14.82%	-5.74%	-12.50%	104.13%
2.5% & -2.5%	5.29%	3.94%	19.85%	2.26%	-0.34%	5.79%	4.93%	-5.09%	-9.00%	22.98%	-10.89%	-13.46%	128.72%
3.0% & -2.5%	9.48%	7.03%	25.85%	-4.76%	1.63%	11.63%	-0.34%	-0.34%	-10.45%	24.63%	-7.80%	-24.09%	178.35%
3.5% & -2.5%	0.96%	-2.25%	17.19%	-18.08%	3.62%	17.76%	-1.47%	4.62%	-7.35%	25.03%	-4.60%	-31.34%	166.62%
4.0% & -2.5%	-2.58%	-0.34%	14.18%	-16.88%	5.65%	24.19%	2.92%	2.92%	-4.16%	32.50%	-1.32%	-30.67%	202.29%
4.5% & -2.5%	-0.21%	1.60%	18.09%	-15.67%	0.46%	30.95%	7.47%	-12.78%	-7.54%	40.38%	-4.80%	-30.00%	254.60%
5.0% & -2.5%	-11.92%	-3.86%	-2.31%	-14.45%	1.91%	18.95%	12.21%	-10.23%	-17.99%	48.69%	-2.02%	-29.33%	213.43%
5.5% & -2.5%	-10.65%	-2.48%	-0.43%	-13.22%	3.38%	14.72%	17.13%	-7.63%	-16.42%	57.44%	-6.85%	-28.65%	248.80%
6.0% & -2.5%	-9.37%	-1.08%	1.48%	-19.06%	4.86%	19.16%	22.24%	-4.96%	-14.81%	66.67%	-4.62%	-33.77%	287.71%
2.0% & -3.0%	9.69%	4.52%	19.40%	5.99%	-3.78%	13.05%	-4.58%	-4.58%	-7.61%	13.05%	-4.38%	-16.48%	108.76%
2.5% & -3.0%	9.01%	2.34%	19.24%	5.33%	-1.87%	14.57%	1.21%	-9.40%	-8.19%	21.09%	-4.98%	-17.81%	138.78%
3.0% & -3.0%	13.91%	5.39%	25.20%	-2.43%	0.06%	22.08%	-4.87%	-4.87%	-9.67%	22.08%	-0.71%	-29.01%	189.82%
3.5% & -3.0%	4.47%	-4.74%	15.39%	-16.96%	2.03%	30.04%	-6.42%	-0.13%	-6.09%	21.85%	3.73%	-36.46%	168.23%
4.0% & -3.0%	0.77%	-2.88%	11.84%	-15.34%	4.02%	38.48%	-2.26%	-2.26%	-2.38%	29.13%	8.34%	-35.84%	205.96%
4.5% & -3.0%	3.72%	-0.99%	15.68%	-13.70%	-1.59%	47.43%	2.07%	-18.44%	-5.86%	36.81%	4.99%	-35.22%	255.75%
5.0% & -3.0%	6.75%	-6.79%	-5.77%	-12.03%	-0.17%	33.82%	6.56%	-16.06%	-16.97%	44.90%	9.09%	-34.59%	232.62%
5.5% & -3.0%	9.84%	-5.45%	-3.96%	-10.33%	1.27%	29.62%	11.24%	-13.62%	-14.96%	53.43%	4.17%	-33.97%	271.20%
6.0% & -3.0%	13.02%	-4.10%	-2.12%	-16.40%	2.72%	35.92%	16.09%	-11.13%	-12.92%	62.42%	7.69%	-39.02%	315.43%

Table 52: Year by year geometric return buy and sell method 2 (continued)

Appendix X: Year by year geometric return buy and sell method 3

Method 3	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2.0% & 1day	2.67%	2.40%	1.13%	-1.37%	20.10%	13.82%	6.08%	12.86%	14.27%	15.50%	0.74%	-4.98%	7.65%
2.5% & 1day	4.71%	4.43%	3.64%	-2.83%	24.49%	20.13%	9.79%	8.71%	16.77%	13.28%	2.24%	-3.57%	10.86%
3.0% & 1day	2.63%	3.23%	6.21%	-1.88%	32.01%	14.39%	13.61%	2.37%	22.02%	9.64%	-0.32%	-5.63%	14.16%
3.5% & 1day	4.14%	4.75%	8.82%	-8.39%	34.96%	18.93%	12.74%	0.89%	7.84%	4.14%	0.65%	-4.71%	12.95%
4.0% & 1day	5.66%	6.28%	6.81%	-8.39%	42.34%	23.62%	10.71%	3.36%	10.48%	1.51%	-7.10%	-3.79%	15.71%
4.5% & 1day	7.20%	7.82%	8.88%	-8.39%	50.08%	28.47%	13.41%	5.88%	7.68%	-6.86%	-7.10%	-2.86%	18.53%
5.0% & 1day	3.35%	9.38%	5.27%	-8.39%	58.20%	33.49%	16.15%	8.45%	4.21%	-16.78%	-7.10%	-1.92%	21.40%
5.5% & 1day	-1.68%	4.76%	6.79%	-8.39%	66.72%	30.36%	18.96%	11.06%	-0.93%	-16.78%	-7.10%	-0.98%	16.73%
6.0% & 1day	-1.21%	-1.09%	1.96%	-8.39%	75.65%	26.69%	14.25%	13.73%	0.01%	-16.78%	-7.10%	-0.04%	18.97%
2.0% & 2day	3.00%	2.07%	2.05%	-4.23%	24.38%	8.43%	6.06%	13.79%	23.31%	14.12%	-1.77%	-14.95%	9.61%
2.5% & 2day	5.56%	4.61%	5.61%	-5.72%	29.42%	14.44%	10.30%	6.70%	31.44%	6.32%	-0.32%	-13.27%	7.06%
3.0% & 2day	2.88%	3.76%	9.29%	-4.33%	38.58%	16.38%	14.70%	-1.32%	40.05%	5.82%	-3.78%	-15.56%	10.25%
3.5% & 2day	4.90%	5.79%	13.07%	-10.75%	48.34%	22.18%	13.00%	-7.06%	26.83%	-2.03%	-2.84%	-19.07%	7.33%
4.0% & 2day	6.95%	7.86%	11.67%	-10.32%	58.73%	28.23%	10.38%	-4.32%	33.11%	-11.00%	-6.78%	-18.28%	9.95%
4.5% & 2day	9.03%	9.96%	14.94%	-9.89%	69.80%	34.56%	13.61%	-1.52%	31.74%	-8.83%	-6.33%	-17.49%	12.63%
5.0% & 2day	4.86%	12.08%	5.57%	-9.45%	81.58%	41.16%	16.93%	1.35%	21.42%	-18.76%	-5.88%	-16.70%	15.36%
5.5% & 2day	-0.13%	0.85%	7.61%	-9.02%	94.11%	48.05%	20.32%	4.29%	10.04%	-17.59%	-5.43%	-15.90%	9.62%
6.0% & 2day	0.83%	1.81%	2.67%	-8.59%	107.44%	43.43%	15.38%	7.31%	12.68%	-24.26%	-4.98%	-15.10%	11.72%
2.0% & 3day	0.29%	1.98%	2.84%	-6.51%	20.50%	13.74%	6.05%	17.00%	18.24%	16.45%	-0.84%	-12.83%	5.81%
2.5% & 3day	2.28%	4.52%	6.43%	-8.48%	24.17%	20.64%	10.84%	6.83%	24.80%	12.67%	1.12%	-11.10%	8.97%

Table 53: Year by year geometric return buy and sell method 3

Method 3	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
2.0% & 1day	4.90%	5.08%	8.58%	3.64%	1.76%	9.64%	9.76%	8.08%	5.75%	3.68%	7.75%	-5.04%	**154.47%**
2.5% & 1day	1.88%	4.64%	5.78%	3.70%	3.77%	8.40%	12.11%	3.14%	6.92%	7.31%	4.89%	-9.15%	**166.05%**
3.0% & 1day	0.61%	6.70%	8.40%	6.26%	5.82%	13.28%	7.96%	6.73%	2.74%	11.04%	4.53%	-14.62%	**171.90%**
3.5% & 1day	-1.70%	4.27%	6.83%	1.09%	7.90%	18.34%	11.70%	10.42%	5.27%	10.33%	7.10%	-14.62%	**164.63%**
4.0% & 1day	-5.29%	5.79%	8.92%	2.57%	10.01%	23.61%	10.53%	8.56%	7.85%	13.57%	9.72%	-14.62%	**188.41%**
4.5% & 1day	-4.84%	7.33%	11.04%	4.06%	6.53%	22.88%	13.77%	1.22%	5.10%	16.90%	12.40%	-14.62%	**204.50%**
5.0% & 1day	-4.38%	3.44%	1.73%	5.57%	8.07%	20.98%	17.09%	3.18%	1.61%	14.22%	15.12%	-14.62%	**197.74%**
5.5% & 1day	-3.92%	4.43%	2.70%	7.09%	9.63%	17.73%	20.48%	5.17%	3.08%	16.98%	11.26%	-14.62%	**199.53%**
6.0% & 1day	-3.46%	5.43%	3.68%	1.56%	11.20%	13.58%	23.96%	7.18%	4.56%	19.79%	13.39%	-14.62%	**202.89%**
2.0% & 2day	7.30%	2.59%	9.27%	-0.52%	-12.77%	13.82%	1.42%	5.75%	3.03%	3.54%	5.53%	-7.80%	**117.01%**
2.5% & 2day	3.78%	1.54%	5.27%	-0.92%	-11.04%	16.16%	6.52%	-3.07%	3.69%	8.22%	-2.23%	-15.32%	**114.76%**
3.0% & 2day	3.30%	3.54%	8.40%	1.53%	-9.29%	23.17%	1.20%	0.79%	3.41%	13.08%	-2.80%	-20.58%	**142.48%**
3.5% & 2day	1.36%	0.07%	6.73%	-5.02%	-7.51%	30.57%	5.21%	4.79%	6.98%	12.22%	-0.41%	-20.19%	**134.50%**
4.0% & 2day	-2.10%	1.53%	9.34%	-3.63%	-5.70%	38.37%	9.36%	8.92%	10.67%	10.83%	2.03%	-19.80%	**176.01%**
4.5% & 2day	-6.67%	3.01%	12.00%	-2.23%	-12.58%	46.60%	13.66%	0.06%	8.43%	14.63%	4.51%	-19.42%	**214.22%**
5.0% & 2day	-10.93%	-0.88%	-3.38%	-0.81%	-11.31%	35.32%	18.10%	2.98%	5.42%	11.26%	7.04%	-19.03%	**183.32%**
5.5% & 2day	-10.50%	0.07%	-2.46%	0.62%	-10.03%	31.43%	22.69%	5.97%	7.97%	14.49%	2.17%	-18.64%	**190.60%**
6.0% & 2day	-10.08%	1.03%	-1.53%	-5.80%	-8.74%	37.16%	16.15%	-14.42%	10.56%	17.79%	4.13%	-18.25%	**178.35%**
2.0% & 3day	3.64%	2.73%	9.00%	-2.34%	-7.26%	10.11%	-0.07%	2.01%	2.73%	0.76%	3.99%	-5.18%	**102.87%**
2.5% & 3day	0.06%	0.91%	5.35%	-1.92%	-5.42%	5.93%	4.96%	-4.86%	2.48%	4.80%	-3.98%	-8.70%	**103.30%**

Table 54: Year by year geometric return buy and sell method 3 (continued)

Method 3:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
3.0% & 3day	-1.56%	3.09%	10.13%	-7.59%	31.66%	17.28%	15.82%	0.27%	31.69%	13.35%	-0.95%	-13.14%	12.21%
3.5% & 3day	-0.12%	5.11%	13.94%	-14.74%	39.57%	23.12%	15.97%	-6.81%	18.13%	7.55%	0.51%	-16.79%	10.55%
4.0% & 3day	1.34%	7.16%	12.06%	-14.74%	47.91%	29.22%	13.10%	-4.53%	22.79%	-6.33%	-8.89%	-15.98%	13.26%
4.5% & 3day	2.82%	9.25%	15.34%	-14.74%	56.70%	35.59%	16.97%	-2.20%	20.35%	-9.35%	-8.45%	-15.17%	16.02%
5.0% & 3day	4.30%	11.36%	5.89%	-14.74%	65.98%	42.25%	20.96%	0.17%	17.58%	-17.56%	-8.01%	-14.35%	18.83%
5.5% & 3day	-0.92%	0.68%	7.93%	-14.74%	75.75%	49.19%	25.07%	2.58%	4.94%	-16.77%	-7.57%	-13.53%	13.01%
6.0% & 3day	0.02%	1.64%	2.22%	-14.74%	86.05%	46.13%	20.00%	5.05%	6.95%	-15.98%	-7.13%	-12.71%	15.18%
2.0% & 4day	7.09%	3.57%	-0.05%	-7.27%	15.83%	5.51%	-1.36%	12.27%	11.87%	10.26%	-0.75%	-4.72%	6.87%
2.5% & 4day	10.29%	6.14%	2.43%	-9.42%	17.45%	9.20%	1.59%	5.50%	16.35%	3.96%	0.72%	-3.31%	10.06%
3.0% & 4day	6.51%	4.12%	4.96%	-8.54%	22.73%	8.01%	4.61%	-1.03%	20.98%	2.13%	-0.99%	-1.88%	13.34%
3.5% & 4day	9.13%	6.17%	7.54%	-12.73%	28.21%	11.21%	7.71%	-3.53%	8.12%	-0.46%	-0.02%	-5.67%	11.68%
4.0% & 4day	11.80%	8.24%	4.94%	-12.30%	33.92%	14.48%	6.07%	-1.65%	10.77%	-3.60%	-3.76%	-4.75%	14.42%
4.5% & 4day	14.52%	10.35%	6.98%	-11.88%	39.85%	17.84%	8.65%	0.26%	6.00%	-2.67%	-3.30%	-3.83%	17.20%
5.0% & 4day	11.33%	12.48%	9.05%	-11.46%	46.01%	21.27%	11.28%	2.20%	2.60%	-8.18%	-2.83%	-2.91%	20.05%
5.5% & 4day	6.05%	2.10%	11.15%	-11.03%	52.41%	24.79%	13.97%	4.17%	-4.79%	-7.74%	-2.37%	-1.98%	16.44%
6.0% & 4day	7.57%	3.07%	6.54%	-10.61%	59.06%	19.78%	8.66%	6.17%	-3.88%	-7.30%	-1.91%	-1.04%	18.67%
2.0% & 5day	5.17%	3.22%	-1.41%	-4.42%	18.04%	9.28%	-0.11%	11.61%	14.33%	10.82%	0.71%	-6.02%	2.89%
2.5% & 5day	7.26%	5.26%	0.54%	-7.40%	20.48%	13.10%	1.87%	2.76%	16.38%	14.70%	1.70%	-5.09%	4.93%
3.0% & 5day	9.37%	3.22%	2.52%	-6.95%	26.51%	17.04%	3.88%	5.81%	21.02%	11.76%	2.70%	-4.16%	7.00%
3.5% & 5day	11.52%	4.73%	4.54%	-10.71%	28.09%	21.09%	5.92%	4.46%	9.03%	4.51%	3.70%	-3.23%	4.53%
4.0% & 5day	13.70%	6.26%	1.71%	-10.71%	33.79%	25.26%	2.52%	7.02%	11.70%	2.15%	0.57%	-2.28%	6.06%
4.5% & 5day	15.91%	7.81%	3.19%	-10.71%	39.71%	29.55%	4.01%	9.62%	8.69%	3.63%	1.05%	-1.34%	7.60%
5.0% & 5day	18.15%	9.37%	4.68%	-10.71%	45.87%	33.97%	5.52%	12.28%	3.92%	-2.48%	1.54%	-0.39%	9.16%
5.5% & 5day	12.77%	3.81%	6.19%	-10.71%	52.26%	38.51%	7.04%	14.99%	-1.41%	-1.54%	2.03%	0.56%	10.73%
6.0% & 5day	14.38%	4.80%	7.71%	-10.71%	58.90%	34.83%	8.57%	17.75%	-0.47%	-8.40%	2.51%	1.52%	12.32%

Table 55: Year by year geometric return buy and sell method 3 (continued)

Method 3:	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Final return
3.0% & 3day	-1.44%	2.40%	8.48%	0.50%	-3.56%	11.23%	-5.24%	-1.07%	1.59%	8.97%	-4.56%	-15.74%	**113.84%**
3.5% & 3day	-3.26%	-0.58%	11.69%	-5.51%	-1.66%	16.77%	-1.96%	2.85%	4.09%	8.20%	-2.21%	-18.86%	**105.54%**
4.0% & 3day	-7.37%	0.39%	14.98%	-4.13%	0.26%	22.56%	-2.95%	-1.32%	6.64%	11.92%	0.18%	-18.47%	**119.05%**
4.5% & 3day	-6.48%	1.36%	18.35%	-2.73%	-6.75%	28.60%	-0.10%	-9.45%	3.35%	15.76%	2.62%	-18.08%	**149.59%**
5.0% & 3day	-11.13%	-3.31%	3.12%	-1.32%	-5.40%	24.34%	2.81%	-7.25%	-1.13%	12.74%	5.11%	-17.68%	**133.55%**
5.5% & 3day	-10.70%	-2.85%	4.61%	0.10%	-4.04%	22.00%	5.79%	-5.01%	0.29%	16.01%	0.83%	-17.29%	**135.34%**
6.0% & 3day	-10.28%	-2.39%	6.11%	-6.37%	-2.66%	26.72%	8.85%	-8.95%	1.73%	19.36%	2.76%	-16.90%	**150.64%**
2.0% & 4day	1.71%	1.84%	5.42%	-2.85%	-0.91%	12.95%	7.20%	10.15%	2.58%	0.42%	7.58%	-4.13%	**101.08%**
2.5% & 4day	-1.67%	0.06%	1.29%	-3.58%	0.56%	7.40%	13.15%	-0.28%	2.64%	3.93%	2.46%	-2.23%	**94.67%**
3.0% & 4day	-3.45%	1.54%	3.29%	-2.16%	2.04%	11.67%	3.00%	3.18%	-1.39%	7.54%	1.77%	-9.08%	**92.91%**
3.5% & 4day	-5.78%	-1.60%	5.32%	-4.92%	3.54%	16.10%	1.94%	6.75%	0.55%	5.29%	4.27%	-12.49%	**86.33%**
4.0% & 4day	-9.85%	-0.64%	7.38%	-4.00%	5.05%	20.68%	1.49%	10.43%	2.51%	8.39%	6.82%	-12.06%	**114.77%**
4.5% & 4day	-9.42%	0.32%	9.47%	-3.07%	1.57%	25.42%	4.96%	8.57%	-0.98%	11.57%	9.42%	-11.64%	**146.16%**
5.0% & 4day	-8.98%	-4.31%	5.24%	-2.14%	2.55%	19.07%	8.54%	11.74%	-5.94%	8.98%	12.08%	-11.21%	**146.52%**
5.5% & 4day	-8.55%	-3.85%	6.76%	-1.20%	3.53%	23.11%	12.23%	14.98%	-5.04%	11.61%	7.76%	-10.79%	**153.72%**
6.0% & 4day	-8.11%	-3.39%	8.29%	-7.40%	4.52%	19.36%	16.02%	-3.36%	-4.14%	14.29%	9.82%	-10.36%	**140.31%**
2.0% & 5day	5.13%	1.80%	4.81%	-7.83%	-3.68%	11.43%	0.95%	10.32%	-1.68%	4.84%	5.87%	1.73%	**97.78%**
2.5% & 5day	4.09%	0.21%	0.95%	-9.38%	-2.25%	5.99%	4.99%	10.02%	-3.16%	8.50%	0.17%	3.75%	**100.35%**
3.0% & 5day	3.67%	1.19%	2.94%	-8.49%	-0.80%	5.96%	1.05%	14.40%	-1.73%	12.27%	2.15%	-2.42%	**129.91%**
3.5% & 5day	1.35%	-2.11%	0.88%	-11.24%	0.65%	9.10%	4.04%	18.94%	-0.28%	10.63%	4.15%	-6.07%	**118.23%**
4.0% & 5day	-1.94%	-1.64%	2.35%	-10.81%	2.12%	12.31%	2.39%	23.63%	1.17%	13.89%	6.19%	-5.61%	**141.80%**
4.5% & 5day	-0.99%	-1.16%	3.84%	-10.38%	3.61%	10.27%	4.89%	15.92%	-2.82%	17.23%	8.25%	-5.16%	**162.24%**
5.0% & 5day	-6.19%	-0.69%	-0.74%	-9.95%	5.11%	3.22%	7.43%	19.30%	-6.78%	14.23%	10.35%	-4.70%	**161.47%**
5.5% & 5day	-5.74%	-0.21%	0.21%	-9.52%	6.62%	5.21%	10.02%	22.77%	-6.34%	16.99%	5.84%	-4.25%	**176.83%**
6.0% & 5day	-5.29%	0.26%	1.17%	-15.38%	8.15%	7.22%	12.66%	-0.98%	-5.89%	19.80%	7.36%	-3.79%	**169.00%**

Table 56: Year by year geometric return buy and sell method 3 (continued)