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Anomalies in financial markets

Just small-market phenomena?

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Preface and acknowledgements

We enjoyed working on the analysis throughout this paper, for there are still a lot of people who differ in their opinions about the anomalies found in financial markets and their explanations. One group of people share the vision that stocks returns are just a reward for risk, and hence riskier stocks should generate higher returns than the less risky stocks. However, another group counter this argument by saying that the anomalies persist even when accounting for different risk factors, thus returns are not a reward for risk. This group further has the opinion that the anomalies exist and persist because of the behaviour of market participants and biases in this behaviour. Whereas, there is another group that just is convinced that markets are not efficient. Via this research our intentions were to contribute to the existing beliefs about these anomalies and to shed light on the real direction of explaining these anomalies. In our opinion we did manage to shed further light on this subject, which is still one of the main discussions in recent literature.

Abstract

This paper analyzes three anomalies found in existing literature with regards to the S&P500 stock universe. In order to shed more light on the thoughts of these anomalies only being small-market phenomena. We find the momentum effect being persistent in the S&P500 for the one-month and three-month holding period. Moreover, regarding the three-month holding period the momentum effects holds for the total sample period 1981-2013. The reversal effect does not hold, irrespective of the holding period. Hence, the reversal effect might be just a small-market phenomena. We conclude with the finding that the volatility effect also does not hold for the S&P500, because it is shown that the exact opposite is true for the S&P500 than what is found in the existing literature. The high-volatility stocks seem to outperform the low volatility stocks during the whole sample period, with respect to all three holding periods. Thus, our findings indicate that only the momentum effect is not just a small-market phenomena. Whereas, the volatility strategy shows that riskier stocks are rewarded with higher returns.

JEL classification: G12

Keywords: Anomalies, CAPM, Factor models, S&P500, Alpha

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1. Introduction

One of the most studied financial market phenomenon is the relationship between the return of an asset and its recent past relative performance, which is labelled as momentum effect. This effect was first found and described by Jegadeesh & Titman (1993). Their main finding was that stocks with the highest recent returns outperformed the stocks with the lowest recent returns in the next couple of months. They further showed that a strategy with a long position in recent winners and a short position in recent losers generates returns which cannot be explained by traditional risk factors. However, it was shown that the momentum effect only holds for the intermediate term, so the next twelve months after portfolio formation. The months thereafter the recent losers tend to outperform the recent winners, this effect is called the reversal effect and was first found by De Bondt & Thaler (1985) and later confirmed by the findings of Jegadeesh & Titman (2001).

These two anomalies started a wave of debates in the finance literature, where the main focus was to find explanations or theories for the profitability of those strategies. Many of those were, however, competing with each other. Conrad & Kaul (1998) and others shared the opinion that the findings of Jegadeesh & Titman (1993, 2001) and others might be biased due to data issues such as data snooping or data mining. At the same time, other researchers shared the opinion that the higher returns are just a reward for risk, which basically confirms the main thought of the mean variance framework. While others came to the conclusion that market efficiency just does not hold anymore. However, the finding that those anomalies arise because of data mining is hard to address, for empirical research in nonexperimental settings is limited by data availability (Jegadeesh & Titman, 2001).

Resulting from these two anomalies, many researchers also tried to find other strategies which seem anomalous at first sight or contradict existing theories. Maybe the most controversial strategy found by many papers recently is the volatility strategy, where investors go long in the low-volatility stocks and short in the high-volatility stocks. Many of the existing literature so far shared the opinion that returns must be a reward for risk, therefore the high-volatility stocks should outperform with respect to their peers. However, the findings of Blitz & Van Vliet (2007) and others already show that the exact opposite is true. This strategy is able to deliver abnormal returns when the investor takes positions as described above. The abnormal performance is also a first indication that the “reward-for-risk” theory does not hold.

The profitability of all three mentioned strategies is generally seen as an anomaly in the finance literature, the returns cannot fully be explained by the risk factors. In many papers the high returns remain even after controlling for the different traditional risk factors, like the exposure to market risk, size, and the book-to-market ratio. Thus, the abnormal performance of these strategies seems to be persistent and hence there must be other reasons why these opportunities are not arbitraged away by the rational investors.

The majority of the existing literature focusses on the cross-section of the expected stock returns, and thus only go long in the top performers as perceived by the anomaly. In our paper we do not deviate from this perspective, but we contribute to the existing literature by also looking at the effects of several macroeconomic fundamentals on the returns of the strategies. Moreover, throughout this paper multiple holding periods are assumed because not every investor holds his portfolios for the same amount of time. On top of that, we also take into account the sentiments of investors and the types of presidents in order to explain the performance of the strategies. Also, most existing literature and their findings relate to the AMEX and NYSE stock indices and thus it might be that those anomalies are just small-market phenomena. Our paper adds value to this aspect because it only takes into account stocks from the S&P500, to see if the anomalies are only small-market phenomena. The goal of this paper is to contribute to the existing literature which states that anomalies are only small-market phenomena.

It seems that the opportunities are not getting arbitraged away by the investors. Therefore, these strategies still remain profitable after controlling for various risk factors. The persistence of these anomalies have caused many researchers to switch their focus on behavioural models, which are based on the main idea that these strategies remain profitable because there is a bias in the behaviour of the investors (Jegadeesh & Titman, 2001). For example, Daniel, Hirshleifer & Subrahmanyam (1998) and Hong & Stein (1999) focus on the idea that investors are biased in their interpretation of information, which might be the cause for under- and overreaction. Not only the difference in interpretation could lead to substantial under- and overreaction but also the fact that information only slowly diffuses in the market (Chan, Jegadeesh, & Lakonishok, 1996). This could be the result because of the overconfidence investors have in their private information, as mentioned by Daniel, Hirshleifer and Subrahmanyam (1998). Therefore, we decided to look at the effects of the different types of investor sentiment on the profitability of the strategies.

Another factor that might influence the behaviour of the investors is the type of president at times of the investmens. Hence, we also look at the effects of the two types of presidents on the performance of the three strategies.

Also, risk might be an important factor why investors do not arbitrage away the opportunities. For example, Chabot, Ghysles, and Jagannathan (2013) show that the momentum strategy delivers large negative returns during bad market times. In order to test the influence of risk on the performance of the strategies, we look at the profitability of these strategies during the different business conditions. Not only do we use the recession indicator and gdp as variables for the business conditions, but also the other macroeconomic fundamentals that were needed to construct the sentiment variable as we will discuss in section 4.

We find that, conform our expectations, the momentum strategy still delivers abnormal returns throughout the whole sample period even after controlling for the different factors. This finding only holds for investors with a horizon of three months. In case they hold their portfolios for one month, we show that the momentum strategy is only profitable in the period 1998-2005. The momentum strategy is unable to deliver abnormal returns when the holding period is six months. Furthermore, we find evidence that the reversal strategy is unable to live up on our expectations. Regardless of the holding period, we see that the performance of the reversal strategy is fully explained by the traditional risk factors. Our findings contradict the findings of De Bondt & Thaler (1985) and many others. Moreover, these findings indicate that the reversal effect might indeed only be a small-market phenomenon. Lastly, we show that the volatility strategy delivers abnormal returns throughout the whole sample period, irrespective of the holding period. However, the abnormal returns have the opposite sign than what is expected. Moreover, the volatility strategy remains generating negative returns when the other explanatory factors are taken into account. Hence, investors should go long in the high volatility stocks and our evidence might prove the volatility effect to be just a small-market phenomenon.

The remainder of the paper is organized as follows: Section 2 discusses the existing literature regarding these anomalies and our expectations based on earlier findings, section 3 provides details about the data that is used throughout this paper, section 4 does this for the methodology that is used to do the analysis, in section 5 the results regarding the profitability of the different strategies is examined and section 6 concludes the paper.

2. Theoretical framework

The momentum effect was first found by Jegadeesh and Titman in their 1993 paper. They found that strategies with a long position in past winners and a short position in past losers generate significant positive returns over 3- to 12 month holding periods. Moreover, the profitability of these strategies was not caused by the systematic risk of these strategies or by delayed stock price reactions (Jegadeesh & Titman, 1993). The strategy with both holding period and formation period set equal to six months generated an annual abnormal return of about 12%. The same effect was found with regards to mutual funds and their trading strategies with quarterly portfolio holdings. On average, funds that implemented strategies based on momentum were able to realize significantly better performance than other funds (Grinblatt, Titman, & Werners, 1995). The momentum effect does not only hold for US stock markets, for other papers were also able to find evidence for the momentum effect in other countries. Fama and French (2012) examined four regions and found that except for Japan there was return momentum everywhere, and the spread in the average momentum returns was shown to be decreasing from smaller to bigger stocks. The higher spread for smaller stocks confirmed evidence found by Banz (1981), stocks with a lower market capitalization had the tendency to have higher average returns. With the use of stock index data for 24 countries over the period 1989-2001, it is shown that winner portfolios stochastically dominated loser portfolios at the second and third order (Fong, Wong, & Lean, 2005). They, furthermore, showed that the results were robust to two sub periods and survived reasonable transaction costs. Another interesting result is that momentum profits are higher when this strategy is implemented on markets that experienced an increase in volume in the previous period (Chan, Hameed, & Tong, 2000). This theory seems to be consistent with the herding behaviour theory, which assumes that people have the tendency to follow the crowd with buy and sell decisions. The momentum effect is shown to be stronger when the portfolio formation is based on the past 11-month cumulative return for the very first month shows some evidence of a short-term reversal effect (Figelman, 2007).

De Bondt and Thaler (1985) were one of the first who documented evidence consistent with the overreaction hypothesis, which states that most people overreact to unexpected and dramatic news events. Their results showed that the (prior) loser portfolios outperform the (prior) winner portfolios 36 months after the portfolios were formed with a massive 25%, even though the losers are significantly more risky. Also, in principle both overreaction and delayed reaction could lead to the profitability of contrarian strategies, there are results which indicate that the delayed reaction cannot be exploited by contrarian investment strategies (Jegadeesh & Titman,

1995). The same authors found in their 1993 paper that part of the abnormal returns generated in the first year after portfolio formation disappeared in the following two years, which confirms the findings of de Bondt and Thaler (1985). Moreover, momentum strategies generate negative abnormal returns in the 13 to 60 months following the portfolio formation which provides evidence for the post holding period reversal effect (Jegadeesh & Titman, 2001). There has also been some research which explored potential explanations for reversals in the relative performance of national stock markets over a period of several years. It showed that the returns of the prior losers were not significantly riskier than the returns of the prior winners. However, the reversals are shown to be larger for the smaller markets than the bigger markets but it is not just a small-market phenomenom (Richards, 1997). Research also showed that the reversal effect is better measured when the portfolios are not formed on the past cumulative 36-month return for the months 2 to 11 show signs of intermediate term momentum effect. Therefore, for better measurement the first 12 month of that time period should be removed from the cumulative return (Figelman, 2007).

Another anomalous trading strategy is the one based on the low-volatility effect (Ang A. , Hodrick, Xing, & Zhang, 2006). According to the traditional risk models there is a positive relationship between the systematic risk of a stock and its expected return. However, there are some papers that find evidence which contradicts this assumption. Portfolios of stocks with the lowest historical volatility are associated with improvements in the Sharpe ratio and a statistically significant alpha (Blitz & Van Vliet, 2007). They found that the high-risk stocks are very unattractive while the low-risk stocks are particularly attractive to most investors because of the overperformance. In their paper, the portfolios are formed on the basis of the past three-year volatility. Another study formed portfolios based on the past one-year volatility and found similar results regarding the performance of the low-volatile stocks in terms of Sharpe ratio and risk-adjusted returns. Extending the study to the developed and emerging markets also shows the effectiveness of the low-volatility strategies on a global scale (Soe, 2012). In his 2012 paper he also mentions that the volatility effect brings new light to the CAPM criticism, the cross-sectional variation in stock returns cannot be explained by the market risk alone. Furthermore, over the past 41 years there is evidence which shows that the high-volatility stocks have substantially underperformed low-volatility stocks in US markets (Baker, Bradley, & Wurgler, 2010). Not only is this the case for the US stock markets but also around the world, stocks with recent past high idiosyncratic volatility have low future average returns. Across 23 developed markets, the difference in average returns between the extreme portfolios is -1.31% per month, after controlling for the market size, value and size effect factors (Ang, Hodrick, Xing, & Zhang, 2009). Even for emerging markets there is evidence that the relationship between market risk

and return is flat or negative, which is in contradiction with the CAPM that states that returns are a reward for risk. It also appears that the volatility effect is growing stronger over time, which may be due to increased delegated portfolio management (Blitz, Pang, & Van Vliet, 2013). In their research they only included stocks from the S&P stock index for there was some critique on the volatility effect in that it would have been caused by small caps. On the contrary, another research found indirect evidence for a positive relation between expected risk premiums and volatility, and hence higher volatility should indicate higher returns (French, Schwert, & Stambaugh, 1987). Yet another research showed there is no relation at all between the volatility of stocks and their expected returns, after estimations with various models they conclude that the relationship is weak if there is any (Baillie & DeGennaro, 1990).

For these phenomena a variety of explanations were considered. At first it was thought that issues with the data were responsible for these anomalous relationships. First arguments were that issues like microstructure or data snooping biases were responsible for these relations (Conrad & Kaul, 1989) and (Low & MacKinlay, 1988). However, Jegadeesh and Titman (2001) showed that the momentum profits continued in the 90's and thus their previous results were not due to data snooping bias. Thereafter, people start argueing that the returns from these strategies were compensations for the risk they took. Based on this thought we saw that the asset pricing models of Sharpe (1964), Lintner (1965), and Black (1972) had a long-term impact on what practitioners thought about the average returns and the risks. These models suggest that expected returns of securities are positively related with the market risks and that the market risks are suffice to fully describe the cross-section of expected stock returns (Fama & French, 1992). However, Fama and French (1992) found that the relation between returns and market risk is flat even if the market risk is the only explanatory variable. These findings were a first indication that market risk on its own is not able to fully explain the stock returns. Further evidence indicated that the profitability of the momentum strategies were consistent with delayed price reactions to firm-specific information (Jegadeesh & Titman, 1993). Fama and French (1993) used two more variables when explaining the cross-section of stock returns, namely the size factor and value factor. The size factor, which they called SMB, is the return difference between the small-cap portfolios and large-cap portfolios which was based on the size effect captured by Banz (1981). Thus it should capture the higher risk of the smaller companies. The other factor was HML, or value effect, which is the return difference of the high book-to-market stocks portfolio and the low book-to-market stocks portfolio. This factor should capture the risk of the relative distress firms. However, the results in their 1996 paper indicate that these factors together still were unable to fully explain the cross-section of the momentum stock returns. Therefore, Carhart (1995, 1997) also constructed a multi-factor model in which he

added a factor for the momentum effect itself for fully explaining not only the performance of the momentum strategy but also other strategies when left unexplained by the three-factor model.

It becomes clear that a lot of research is aimed at trying to explain various anomalies with several risk factors, but up until now there is no robust evidence of a successful risk-based explanation. This failure has led to the beginning of research which looks at the market participants and their behaviour, in the hope to find evidence of a behavioural-based explanation regarding the market inefficiencies. A theory regarding market under- and overreactions is based on two well-known psychological biases; overconfidence in private information and the self-attribution bias which can cause an increase in this overconfidence (Daniel, Hirshleifer, & Subrahmanyam, 1998). When market signals confirms the private information of investors it is shown that those investors become even more confident about their own information, while ignoring other information. This effect is called the self-attribution bias. It is common to see positive return correlations corresponding with underreactions to public news, while negative return correlations correspond with overreaction to public news. However, positive return autocorrelations can be a result of continuing overreaction (Daniel, Hirshleifer, & Subrahmanyam, 1998). They further showed that this positive return autocorrelation is followed by a long-run correction. Hence, short-run positive return autocorrelations and long-run negative return autocorrelations can be consistent with each other. These results indicate that the behaviour of market participants are causing the short-term momentum effect and the long-term reversal effect, which are both being dicussed in this paper. Also, markets only gradually respond to new information, thus the information diffusion is slow which causes the short-term momentum (Chan, Jegadeesh, & Lakonishok, 1996). Another research also focused on a market populated by two groups of investors; the newswatchers and momentum traders. It showed that the newswatchers observed private information, but were unable to extract other newswatchers' information from the prices. Therefore, information only diffuses gradually among the population and prices underreact on the short run (Hong & Stein, 1999). Due to this underreaction the momentum traders can earn profits by 'trend-chasing', in order to arbitrage away this mispricing. Hong and Stein (1999) further mentioned that this can lead to overreaction at long horizons when the momentum traders can only implement simple, univariate strategies. They also showed results of underreaction in the short run and overreaction in the long run.

Based on this 'two-group' market model there are many other research which show that market inefficiencies are mainly due to the behaviour of market participants on the short- and long-term. In those research the following two groups are assumed to populate the markets; the

fundamentalists and the chartists. The fundamentalists are investors who assume that prices will eventually revert back to their fundamental value, while the chartists use technical trading rules based on past returns and thus extrapolate the past into the future (De Grauwe & Markiewicz, 2013). Most of these research show that the chartist trading strategies can result in prices moving away from their fundamental value, because the unpredictability of the chartists creates a risk in the prices and thus prevent the rational traders to arbitrage it away (De Zwart, Markwat, Swinkels, & Van Dijk, 2009). Moreover, the profitability of the chartist trading strategies increase while the profitability of the fundamentalist trading strategies decrease. More investors decide to implement the chartist trading strategies which causes the prices to move away even further from the fundamental value and thus short term momentum. However, the fundamentalists know that at some point in time the prices will revert back to the fundamental value and therefore sell the stocks. Resulting from that sell decision, the prices revert back a little to the fundamental value and the profitability of the fundamentalists increase while it decreases for the chartists. More and more investors switch to the fundamental trading strategies and prices fully revert back, which results in long-term reversal (De Long, Shleifer, Summers, & Waldmann, 1990). This herding behaviour, as mentioned by Hirshleifer and Teoh (2003), can be the cause for most bubbles we saw thus far. During those bubbles it is shown that at first the prices move away from fundamental value (short-term momentum) and eventually revert back to it (long-term reversal) (see for example (Kouwenberg & Zwinkels, 2011)).

3. Data

In order to test the before mentioned strategies, based on different anomalies found in existing literature, ten portfolios will be constructed. The decision to use portfolios is based on the fact that the effects of potential anomalies are magnified when using portfolios (Versijp, 2013). The stocks used to construct these portfolios are currently all part of the S&P 500 stock index. Regarding all those stocks the monthly return indices are gathered to do the analysis, these monthly return indices are obtained via Datastream. The monthly return indices are chosen because they are more normally distributed than daily return indices (Fama, 1976). Throughout the whole analysis the transaction costs for the investment strategies are assumed to be zero.

The data period in this analysis includes all months from the year 1980 up to and including the year 2013. However, regarding the three investment strategies the start of the sample periods are different. For the momentum strategy the sample period starts in January 1981, the investment strategy based on the reversal-effect starts in February 1982 and the strategy based on the volatility-effect starts in February 1981. This research is not only looking at the investment strategies over the whole sample period, but also looks at different subsamples for isolating the different crises and their potential effects on the performance of the three strategies. Moreover, the sample periods regarding the three strategies will be split in two and in four parts, thus this research will not only have two subsamples but four more subsamples. During the total sample period it is found that the United States of America had exactly five presidents, three of them are from the Republican Party and the other two of the Democratic Party. Therefore, this analysis will also use a dummy variable regarding the political colours of the presidents. This decision is made because it might be worthy to see if the performance of the three investment strategies is different when the president is democratic or republican.

The portfolios that are constructed throughout the whole sample period include only the stocks with at least five years of monthly return data, so only the stocks with return data starting in January 2009 are considered in the data set. Therefore, the total numbers of stocks in the dataset varies between 224 stocks in January 1981 and 478 stocks in December 2013.

In this analysis the performance of the three strategies will be tested in different models, namely the CAPM, the Fama & French three-factor model and the Carhart four-factor model. This analysis is done the see if the performance of the strategies can be explained as being a reward for more risk. Thus, the factors of these models are needed to do this analysis. The factors for the market, SMB, HML and MOM are all retrieved from Kenneth French's website. The market index

is proxied with the value-weighted CRSP-index, which includes all stocks from the NYSE, NASDAQ and AMEX stock indices. Also, for research purposes the excess stock returns are needed, these are obtained by subtracting the risk-free rate from the return indices. This risk-free rate is the one-month US Treasury bill rate retrieved from Ibbotson Associates. When considering the other three risk factors please note that during the construction of these factors only stocks were taken into account which have market equity data from December t-1 to June t and book equity data from year t-1.

Not only does this analysis look at a risk based explanation but also at the influence of different macroeconomic fundamentals and sentiments on the performance of the three strategies. Therefore, different macroeconomic indicators will be used to provide this explanation. These macroeconomic indicators include; growth in industrial production, real growth in durable consumption, real growth in nondurable consumption, growth in services consumption, growth in employment and a recession indicator from NBER. Furthermore, this analysis will also use a sentiment index for behavioural explanation purposes. This index is constructed by first regressing the Consumer Confidence Index on all six mentioned macroeconomic indicators and using the residuals as a proxy for investor sentiment. Every month in the whole sample period is then assigned the value of Optimistic, Pessimistic or Mild based on the sentiment in the past three months, this progress will be described in more detail during the section methodology. All macroeconomic indicators are obtained via Datastream for the period January 1980-December 2013.

4. Methodology

4.1 Construction of the portfolios

As mentioned before, ten portfolios are constructed for research purposes. Regarding every strategy the stocks are sorted from winners to losers, so portfolio one contains the winners and portfolio ten the losers, except for the reversal strategy where it is the exact opposite. Throughout the whole analysis the formation period is equal to the 12 months prior to the rebalancing month, unless stated otherwise. This research uses three different holding periods, for the purpose of looking at the potential effects different holding periods might have on the performance of the strategies. The holding periods are equal to one month, three months and six months, meaning that the portfolios are rebalanced not only every month but also every three months and every six months.

For the momentum strategy the ten portfolios are constructed on the basis of the past cumulative 12-month return. Thus, portfolio one contains the stocks with the highest cumulative past 12-month return and portfolio ten the stocks with the lowest cumulative past 12-month return. However, in existing literature evidence is found that the momentum effect can be better measured when ignoring the first month of the formation period and hence only look at the past 11 months prior to the rebalancing month. This due to the fact that the first month shows signs of a short-term reversal, which obviously would affect the momentum in a negative way (Figelman, 2007).

Regarding the reversal strategy the construction of the portfolios is based on the past cumulative 24-month return. Evidence is found that the losers will outperform the winners three to five years after the formation period (de Bondt & Thaler, 1985). However, it is also found by Figelman (2007) that the reversal effect can be better measured by excluding the first 12 months of the formation period for this period reveals a momentum effect, which affects the reversal effect in a negative way by making it less extreme. So, portfolio one contains the stocks with the lowest past cumulative 24-month return and portfolio ten contains the stocks with the highest past cumulative 24-month return.

The final of the three strategies, the volatility strategy, is based on the one-year volatility effect as found by Soe (2012). He found that the stocks with the lowest volatility in the past 12 months outperformed the stocks with the highest volatility during the same period. The portfolios regarding this strategy are constructed on the basis of the volatility measurement, which is

equal to the standard deviation of the past cumulative 12-month returns of the stocks. Thereafter, the stocks are sorted from low volatility to high volatility and thus portfolio one contains the stocks with the lowest volatility and portfolio ten the stocks with the highest volatility. For all three strategies the method of construction stays the same regarding the different holding periods. The following table shows a more complete picture of how the portfolios are constructed regarding all three strategies:

Table 1: Characteristics of the sorting in the different portfolios

Strategy	Portfolio 1	Portfolio 10
Momentum	Highest past returns	Lowest past returns
Reversal	Lowest past returns	Highest past returns
Volatility	Lowest past volatility	Highest past volatility

When the portfolios are constructed for all strategies and regarding the different holding periods assumed in this analysis, the Sharpe Ratios of the difference between the winners and losers and the significance are also calculated. For these Sharpe Ratios can provide more insight into the potential outperformance of the winners, and hence if this outperformance is a compensation for more risk. The following tables show the Sharpe Ratios for the different strategies and holding periods:

Table 2: Sharpe Ratios for the Momentum strategy, all holding periods considered

	1 Month Holding Period		3 Month Holding Period		6 Month Holding Period	
Period	SR1-SR10	Z-value	SR1-SR10	Z-value	SR1-SR10	Z-value
1981-2013	0.1308	-2.4907*	0.2360	-2.5330*	0.4185	-2.8998*
1981-1996	0.1018	-1.5804	0.2197	-2.2195*	0.4868	-2.3819*
1997-2013	0.1282	-1.6774	0.2027	-1.4601	0.2796	-1.4697
1981-1989	0.0691	-0.8184	0.1611	-1.3220	0.2678	-1.0412
1990-1997	0.1122	-1.1683	0.2927	-1.8017	0.7438	-3.2999*
1998-2005	0.2207	-1.7786	0.3343	-1.3298	0.5888	-1.4274
2006-2013	0.0520	-0.5544	0.0652	-0.4187	0.0212	-0.0999

**gives significance at the 5% level*

Table 3: Sharpe Ratios for the reversal strategy, all holding periods considered

	1 Month Holding Period		3 Month Holding Period		6 Month Holding Period	
Period	SR1-SR10	Z-value	SR1-SR10	Z-value	SR1-SR10	Z-value
1982-2013	-0.0860	1.3678	-0.2303	2.0888*	-0.3644	2.3841*
1982-1997	-0.2216	2.3628*	-0.3470	2.0905*	-0.5192	2.2626*
1998-2013	-0.0532	0.7280	-0.1077	0.8092	-0.1394	0.7992
1982-1989	-0.1491	1.1183	-0.2026	0.8653	-0.2621	0.8351
1990-1997	-0.1026	1.0783	-0.2798	1.6673	-0.8712	3.0735*
1998-2005	-0.0528	0.4425	-0.1783	0.7383	-0.1509	0.3782
2006-2013	-0.0366	0.4453	-0.0198	0.1451	-0.0257	0.1425

**gives significance at the 5% level*

Table 4: Sharpe Ratios for the volatility strategy, all holding periods considered

	1 Month Holding Period		3 Month Holding Period		6 Month Holding Period	
Period	SR1-SR10	Z-value	SR1-SR10	Z-value	SR1-SR10	Z-value
1981-2013	0.0612	-0.9314	0.1044	-0.9195	0.1520	-0.9374
1981-1996	0.1287	-1.2633	0.2282	-1.2760	0.3435	-1.3750
1997-2013	-0.0546	0.7412	-0.0718	0.5700	-0.2298	1.2220
1981-1989	0.1546	-1.1188	0.2769	-1.1465	0.4120	-1.2126
1990-1997	-0.0930	0.7762	-0.1897	0.7771	-0.3045	0.9162
1998-2005	-0.0884	0.6731	-0.1474	0.6257	-0.6635	1.5209
2006-2013	-0.0522	0.6633	-0.0602	0.4597	-0.1081	0.5522

**gives significance at the 5% level*

For both the momentum strategy and the reversal strategy the tables show that; regarding the 1-month holding period only one Sharpe Ratio of the sample periods in significant, for the 3-month holding period the Sharpe Ratios for two sample periods are significant and for the 6-month holding period the Sharpe Ratios for three sample periods are significant. With regards to the momentum strategy all significant Sharpe Ratios are positive, this means that the winners potentially outperform the losers without having more volatility or are being more compensated for the risk. However, for the reversal strategy the exact opposite is shown, hence the winners are potentially taking more risk in order to outperform the losers. Regarding the volatility strategy none of the Sharpe Ratios are significant and thus it might be that the winners have a higher volatility than the losers or that the winners underperform the losers.

All three investment strategies are based on the fact that the winning stocks should outperform the losing stocks with regards to the returns of the portfolios. Therefore, the average returns during the full sample period should be higher for portfolio one than for portfolio ten. When this is the case, there is already some evidence in favour of the three investment strategies and thus this analysis also provides a table containing the average returns of all strategies for all holding periods.

Table 5: Average returns for the portfolios during the total period, all holding periods considered

Holding Period	Portfolios	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1 Month	Momentum	2.2910	1.3593	1.1330	0.9533	1.0455	1.0759	1.0492	1.9245	1.1963	1.6618
	Reversal	2.4996	1.1854	1.1751	1.1908	1.1541	1.1012	1.1049	1.0702	1.3233	2.0433
	Volatility	0.9203	0.9083	0.9959	0.9709	1.0899	1.2186	1.3181	1.2784	1.6147	3.2933
3 Month	Momentum	6.8544	4.5224	3.5638	3.3124	3.1759	3.0825	3.0062	5.9792	3.4920	4.0913
	Reversal	7.1637	3.6922	3.5778	3.4241	3.3205	3.2414	3.2830	3.5677	4.1686	6.2064
	Volatility	2.7869	2.6640	2.9780	2.9253	3.5801	3.7979	3.5082	4.2384	4.6258	9.6226
6 Month	Momentum	13.6912	7.9101	7.6225	7.1303	6.4509	7.0196	6.3175	7.2678	5.9876	12.6530
	Reversal	14.6020	6.8216	6.6095	6.4968	6.4104	7.0892	6.3206	7.2720	8.3597	12.6081
	Volatility	5.4901	5.3398	6.0037	6.2618	6.8032	7.5811	6.8996	8.7685	9.3358	19.1537

For two out of the three strategies it is indeed shown that the winners, on average, outperform the losers considering the different holding periods. Also, the difference in performance

becomes bigger when the holding period is longer. Based on these results it is expected to see abnormal returns for both the momentum and reversal strategy and negative abnormal returns for the volatility strategy.

4.2 Risk-based explanation

When the portfolios are constructed, the main analysis of this research can start. For the performance of the different portfolios are available and thus the difference between the winners and losers portfolio (which will be named as "spread" onwards). This spread is an important part of the analysis because the three strategies only work when going long in the winners' portfolio and short in the losers' portfolio results in a positive or abnormal return. Therefore, a T-test for inequality is conducted and cross-sectional regressions are run to see if the potential outperformance can be explained by the traditional risk factors included in the three different testing models. All regressions are immediately corrected for serialcorrelation and heteroskedasticity via the Newey-West method. The Sharpe Ratios of the spreads and their significance are also provided for potentially explaining that the performance is not caused by more risk-taking behaviour when implementing those strategies. In the regressions the dependent variable is set equal to the spread and the independent variables are equal to the different risk factors of the traditional models.
For all strategies the spread is tested firstly against the CAPM, where the following regression is run

$$(P1 - P10) = \alpha + \beta(R_m - R_f) \quad (1)$$

Where $(P1 - P10)$ is equal to the spread and $(R_m - R_f)$ is given by the MKT factor.

Secondly, the strategies are tested against the Fama & French three-factor model, where the following regression is run

$$(P1 - P10) = \alpha + \beta_m * MKT + \beta_{smb} * SMB + \beta_{hml} * HML \quad (2)$$

Lastly, the strategies are tested against the Fama & French four-factor model, where the following regression is run

$$(P1 - P10) = \alpha + \beta_{mkt} * MKT + \beta_{smb} * SMB + \beta_{hml} * HML + \beta_{mom} * MOM \quad (3)$$

The purpose of this analysis is to see if there still remain profits that are left unexplained by these models, and thus are not caused by taking more risk. In other words, the strategies are only working when there are significant abnormal returns. These potential abnormal returns are revealed by the alphas in the above mentioned regressions and their significance, thus there is

abnormal performance when the alphas are significantly larger than zero. Also, this is tested via a T-test.

4.3 Fundamental based explanation

When evidence is found in the regressions of the traditional models that there are still returns left unexplained by the models, it might be that those returns are caused or affected by various macroeconomic indicators which can be a proxy for investor sentiment. For that reason, univariate regressions are run for every macroeconomic indicator, which takes the following form

$$(P1 - P10) = \alpha + \beta_1 X_1 \quad (4)$$

Where X_1 is equal to one of the macroeconomic indicators.

When this is done for every macroeconomic indicator, different indicators are used in a multivariate regression. For deciding which indicators to combine, a correlation matrix is constructed between those indicators and only the indicators which are weakly correlated are put in a multivariate regression. To clarify it further, the decision is made that correlations with absolute values up to 0.6 are not regarded as too high and thus all indicators with correlation coefficients less than 0.6 are put in the same regression. When these coefficients are higher than 0.6, the indicators are put in separate multivariate regressions.

Furthermore, this analysis wants to provide evidence of the potential effects investor sentiment might have on the performance of the strategies. Therefore, the Consumer Confidence index is regressed on all the macroeconomic indicators and the resulting residuals are used to proxy investor sentiment (Antoniou, Doukas, & Subrahmanyam, 2013).

It is necessary to identify if a formation period is optimistic, pessimistic or mild. Thus, a weighted-rolling average of the sentiment level for the three months prior to the end of the formation period is calculated. The last month's sentiment gets a weight of three, the month before that a weight of two and the month before that a weight of one (Antoniou, Doukas, & Subrahmanyam, 2013). This is shown in the following formula

$$Weighted - rolling\ average = t(-1) * 3 + t(-2) * 2 + t(-3) * 1 \quad (5)$$

Where $t(-1)$ is equal to the last month in the formation period

The formation period is identified as either one of the three sentiments in the following manner; When the weighted-rolling average of the three months prior to the end of the formation period

belongs to the top 30% the formation period is regarded as optimistic, the formation period is regarded as pessimistic when the weighted-rolling average belongs to the bottom 30% and the remaining weighted-rolling averages are regarded as mild. Hereafter, a dummy variable is constructed for all three sentiments and those dummies are used in a regression with the spread as dependent variable.

Moreover, during the whole sample period there are five different presidents. Three of them are republican and two are democratic, for that reason there is also a dummy variable which takes the value of one for republican presidents and zero otherwise. This dummy variable is also regressed on the spread in a univariate regression.

To conclude, the above mentioned dummy variables are also used in the multivariate regressions with the different macroeconomic indicators to account for the different sentiments and type of presidents simultaneously.

5. Empirical results

Throughout this section the empirical results are presented for all three strategies regarding the different holding periods. The risk-based and behavioural-based explanations are separated in two subsections to provide a clearer overview for the reader, section 5.1 covers the risk-based explanations and section 5.2 the fundamental-based explanations. Also, in this section only the most important results are shown in tables and the remaining results can be found in the different Appendices at the end of this analysis. Please note, an investment strategy is only considered to deliver excess returns when the alpha regarding the full sample period is significant. In that case, the subsamples will also be shown throughout this section and in Appendix C otherwise.

5.1.1 Momentum strategy

The strategy based on the momentum-effect is the first strategy that is discussed, where we first look at the performance of this strategy regarding the one-month holding period. Thereafter, the performance regarding the other two holding periods is discussed. The following table shows the main results of the momentum strategy for the three traditional risk models.

Table 6: Summary statistics momentum strategy, one-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1981-2013	0.6291	1.1159	0.6224	1.4947	0.8334	1.9062	0.6613	1.3699

**gives significance at the 5% level*

The first two columns show the one-month difference in returns of the winners and losers portfolios and their significance. During the whole sample period the recent winners outperformed the recent losers by 0.63% per month, however the difference in performance is insignificant in this testing period and thus there is no evidence which proves that the winners are better performing stocks during the whole sample period. There are different ways to test for the profitability of investment strategies and the capital asset pricing model, where we take into account the sensitivity of the stocks to the market risk, is one of them. The results of this model are given by columns three and four, and show that during the whole sample period there is no abnormal profit to make. Thus, the performance of the momentum strategy with a one-month holding period is fully explained by the market risk factor which confirms the expectations of the CAPM. The subsamples are not shown for the full sample period did not deliver excess returns.

The other way to test the profitability of an investment strategy is via the three-factor model of Fama and French, where we not only take into account the sensitivity to the market risk but also

the size effect and value effect of the stocks. These results are shown in the columns five and six and indicate that during the whole sample period the momentum strategy still remains unprofitable. Also, when the size and value effect are taken into account it is shown that during the period 1981-2013 the relative performance is fully explained and hence there is no abnormal profit to make.

The last method this analysis uses to test the profitability of an investment strategy is the four-factor model of Carhart, which uses the same three factors as the three-factor model and extends it with the momentum factor of the stocks. The results of this model are given by the last two columns of table 6. With regards to the full sample period, the momentum strategy remains unprofitable when the momentum factor is also taken into account. Based on all three different models we can conclude that the momentum strategy is not anomalous throughout the whole sample period when considering a one-month holding period.

Furthermore, if we look at the first two columns of table 2 (pag16.) we see the differences in the Sharpe ratios and their significance for the different testing periods. The results show that during the whole sample period the winners outperform the losers without having a higher volatility. Hence, if volatility is used as the only measure of risk the momentum strategy would be profitable during the whole sample period.

The momentum strategy is also tested when the portfolios are held for three months. In this case there is evidence in favour of the momentum effect during the whole sample period. The main results of this analysis are shown in the following table.

Table 7: Summary statistics momentum strategy, three-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1981-2013	2.7631	1.4647	2.7615	2.2858*	3.7995	2.8067*	0.0321	0.0284
1981-1996	3.9611	1.8364	2.9821	2.8611*	3.5153	3.4118*	1.2619	1.3063
1997-2013	1.6355	0.5372	2.1269	0.9530	3.2398	1.4525	-0.5469	-0.3848
1981-1989	3.5576	1.1408	2.5386	1.6623	3.5492	1.9851	1.7526	1.1443
1990-1997	3.9170	1.5192	3.2772	2.3098*	4.2175	2.6827*	0.8969	0.5396
1998-2005	4.4114	1.1231	4.4279	1.3189	7.7335	2.8774*	1.3160	0.5176
2006-2013	-0.9331	-0.1846	0.2963	0.0934	0.6495	0.2405	0.2301	0.1623

**gives significance at the 5% level*

Firstly, the first two columns show the spreads and their significance. Again, for all but the last sample period the spreads are positive and thus the winners outperform the losers. During the whole period it is shown that the winners outperform the losers by 2.76% over three-months and again this is mainly caused by the sub period 1998-2005 where the winners outperform the losers by 4.41% over a three-month period. Nonetheless, the spread is insignificant in every testing period and thus the winners do not outperform the losers when the portfolios are held

for three months. When the difference in performance is tested against the CAPM, columns three and four show that the momentum strategy is profitable during the whole sample period. The recent winners outperform the recent losers by 2.76% in the next three months, and this outperformance is mainly caused by the sub period 1990-1997 where the outperformance in the next three months is equal to 3.28%. In short, the market risk is not able to fully explain the difference in performance throughout the whole sample period.

Secondly, if we also take into account the size effect and value effect the momentum strategy still remains profitable during the whole period. By going long in the recent winners and short in the recent losers you could earn up to 3.80% over a three month period. Again the sub period 1990-1997 has a big impact but is not the main cause for the abnormal performance. Moreover, if the momentum strategy is used during the period 1998-2005 investors would have earned 7.73% return over a three month period. Thus, when the market risk, size effect, and value effect are the only measures of risk the momentum strategy would be a profitable strategy.

Thirdly, when the momentum strategy is tested against the four-factor model the profitability throughout the whole period disappears. Therefore, going long in the recent winners and short in the recent losers does not provide abnormal returns in the next three months when the momentum factor is also used as a measure of risk. Hence, the relative performance of the winners and losers are fully explained by the four risk factors of this model. Which makes sense because the momentum factor is also taken into account as risk factor.

Moreover, when looking at the difference in the Sharpe ratios and their significance in the columns three and four of table 2 (pag16.) it becomes clear that, in case volatility is used as the only measure of risk, the momentum strategy would be profitable throughout the whole sample period. For, the spread is significantly positive and thus the winners outperform the losers without having a higher volatility. These findings confirm earlier findings by Jegadeesh & Titman (1993).

The same tests are run for the momentum strategy in case the portfolios are held for a period of six months. Again, there is no evidence which shows that the momentum strategy is profitable when controlling for the different risk factors. The main results of this analysis are shown in the following table.

Table 8: Summary statistics momentum strategy, six-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1981-2013	1.0382	0.1760	1.1791	0.2788	3.9095	0.9256	-3.4678	-1.0267

**gives significance at the 5% level*

First of all, the first two columns show the difference in performance between the winners' portfolio and the losers' portfolio and the significance of this relative performance. Regarding the whole sample period we again see that the spread is positive and thus the winners perform better than the losers. Over a period of six months the winners outperform the losers by approximately 1.04% However, the spread is not regarded as significant and thus there is no real evidence that the winners perform better than the losers. The spread is tested when the market risk is taken into account and those results are shown by columns three and four. During the whole period it becomes clear that the winners do not outperform the losers over a period of six months and the momentum strategy is therefore not profitable when implemented in this period. As with the one-month holding period, the market risk is able to fully explain the performance of the momentum strategy. Only in the period 1990-1997 the strategy performs abnormally when the market risk is taken into account as risk factor (table 5, Appendix C).

Columns five and six show the results when the momentum strategy is tested against the three-factor model. In the full sample period the returns on the portfolios are fully explained by the market risk, size effect and value effect, hence the momentum strategy is no longer profitable when the portfolios are held for six months.

Further, the momentum strategy still remains unprofitable throughout the whole sample period when the momentum factor is also taken into account as a risk factor. Those results are depicted by the last two columns of table 8. On the basis of those results it can be argued that the momentum strategy is not an option when having an investment horizon of six months for all profits are explained by several traditional risk factors. The same conclusion is drawn for the other testing models, hence the momentum strategy is only anomalous when the investment horizon is three months.

Nonetheless, when volatility is the only risk factor taken into account the results show that the momentum strategy is indeed profitable for the whole sample period. These results are shown in the last two columns of table 2 (pag16.), where the difference between the Sharpe ratios is significantly positive for the whole sample period. Hence, the winners outperform the losers without having a higher volatility and it might be that the winners are better compensated for the risk than the losers which causes the significant outperformance of the winning stocks.

The momentum strategy, with regards to the S&P500 stock universe, turns out to be only profitable throughout the whole sample period when the investors hold their positions for a period of three months. For the other two holding periods, evidence shows that the risk factors

are able to explain the performance of the momentum strategy. On the contrary, when volatility is used as the only risk measure it is shown that irrespective of the holding period the momentum strategy is always profitable throughout the whole sample period. We see that these results contradict the findings of Jegadeesh & Titman (1993), who did find evidence of the momentum strategy performing well throughout their whole sample period, in case the holding period is either one or six months.

5.1.2 Reversal strategy

The second strategy that is tested for different holding periods against the traditional risk factors is the reversal strategy, in which investors take a long position in the losers of the previous three years and a short position in the winners of the previous three years. First of all, the reversal strategy is discussed when the portfolios are held for one month. It becomes clear that the reversal strategy does not work when investors hold their portfolios for one month only. The main results of that analysis are given by the following table.

Table 9: Summary statistics reversal strategy, one-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1982-2013	0.4563	0.4514	0.5210	0.5172	0.3329	0.3463	0.4992	0.5278

**gives significance at the 5% level*

The first two columns of table 9 depict the spreads and their significance regarding the different testing periods. It shows that during the whole sample period the previous losers outperform the previous winners with 0.46% on a monthly basis. The spread, however, is not significant and therefore there is no real evidence that the previous losers perform better than the previous winners (hereafter called the winners and the losers). When the spreads are tested against the CAPM it becomes clear that the reversal strategy is not profitable during the whole sample period and sub periods. The sensitivity of the stocks to the market risk is able to explain all profits made by the reversal strategy and therefore there is no abnormal return to make.

Moreover, when the size and value effect are also taken into account as risk factors there is still no abnormal return to make throughout the whole sample period by implementing the reversal strategy. Those results are depicted in the fifth and sixth column of table 9. No returns are left unexplained by the three risk factors and thus the reversal strategy does not work when investing in the S&P 500 stock indices with respect to the one-month holding period.

Lastly, next to the market risk, size effect and value effect the momentum factor can also be taken into account as a risk factor. The results of that test are given by the last two columns of

table 9 and are similar to the ones of the three-factor model and the CAPM. For the risk factors are together able to fully explain the performance of the reversal strategy.

When volatility is the only risk factor that is taken into account it is shown by the first two columns of table 3 (pag16.) that during the whole sample period the winners are not able to perform better than the losers. So, in case volatility is the only measure of risk the reversal strategy remains unable to deliver excess returns during the whole sample period.

The reversal strategy is also tested when the investment horizon is set equal to three months. The main results of that analysis are depicted in the following table and are similar to the ones for the one-month holding period.

Table 10: Summary statistics reversal strategy, three-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1982-2013	0.9572	0.3017	0.8677	0.3035	-0.6756	-0.2610	2.5026	1.0114

**gives significance at the 5% level*

The first two columns show the relative performance of the winners and losers with their significance. Over the whole period, going long in the winners and short in the losers result in a 0.96% return over the next three months. Please note, however, that the spread is not regarded as significant and thus there is no evidence in favour of the profitability of the reversal strategy. Furthermore, the columns three and four show the performance of the reversal strategy when the market risk is taken into account. Those results only verify further the conclusion made based on the spreads. The market risk is able to fully explain the performance during the whole sample period, and hence the winners do not outperform the losers.

Likewise, columns five and six show results of the analysis when the size effect and value effect are also taken into account. During the whole period it becomes clear that the reversal strategy is not a working strategy because all profits are explained by the risk factors of the three-factor model. Nevertheless, during the period 1990-1997 the winners underperform the losers with 3.55% in the next three months which cannot be explained by the risk factors. Due to the fact that this abnormal return is negative it still can be concluded that the reversal strategy does not work in the way it should be. Results for the period 1990-1997 are shown in Appendix C table 13.

This conclusion does not change when the momentum factor is also taken into account as a risk factor. Those results are depicted in the last two columns and provide clear-cut evidence of the reversal strategy not having an abnormal positive performance throughout the whole sample period. Again, the reversal strategy can be fully explained by the risk factors and thus there is no

real reason to implement this strategy when investing in S&P 500 stocks for a period of three months.

Volatility can also be used as a measure of risk and those results are given by columns three and four of table 3 (pag16.) Similar to the one-month investment horizon it is shown that during the whole sample period the winners underperform the losers whilst having a higher volatility. Therefore, the conclusion remains the same also because the winners are compensated less than the losers and thus it is not optimal for investors to go long in the past losers and short in the past winners.

Lastly, the reversal strategy is also tested when investors have a horizon of six months. The results are given by the following table and are similar to the other two holding periods.

Table 11: Summary statistics reversal strategy, six-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1982-2013	1.9939	0.2208	2.0905	0.4332	-1.5823	-0.4066	4.6768	1.0978

**gives significance at the 5% level*

The relative performance of the winners and the losers are given by the first two columns. Over the whole sample period the winners outperform the losers with 1.99% over the next six months. Nonetheless, the spread regarding the whole sample period is not perceived as significant and therefore there is no evidence of the winners outperforming the losers when holding the positions for six months. As was the case with the other two investment horizons, the reversal strategy is not able to perform abnormally throughout the whole period when the market risk is taken into account, as can be seen in the columns three and four. The results clearly indicate that the performance of the reversal strategy can be fully explained by the sensitivity of the stocks to the market risk.

Moreover, when the size effect and value effect are also taken into account as risk factors it is again shown that during the whole sample period the winners do not significantly outperform the losers over a period of six months. These results are presented by the fifth and sixth column, which indicate that the performance of the reversal strategy remains fully explained by the three risk factors.

This conclusion remains the same when the momentum factor is also taken into account as a risk factor. These results are given by the last two columns of table 11 and show that during the whole sample period the reversal strategy is not able to provide returns that are left unexplained by the risk factors. Therefore, going long in the past losers and short in the past

winners does not generate profits when the portfolios consist of S&P500 stocks and the positions are held for six months.

Also, volatility can be used as a measure of risk and those particular results are given by the last two columns of table 3 (pag16.). In case volatility is indeed used as the only measure of risk it is shown that during the whole sample period the winners underperform the losers while they also have a higher volatility. Hence, the winners are getting compensated less than the losers and for that reason it is not wise to take a long position in the winners and a short position in the losers when the investment horizon is equal to six months.

To conclude, it is shown that the reversal strategy is unprofitable irrespective of the investment horizon when different risk factors are taken into account. Moreover, only with the three-month and six-month holding period there is evidence found that in the period 1990-1997 the reversal strategy has an abnormal performance when the market risk, size effect and value effect are taken into account(see table 13 & 15 Appendix C). This abnormal performance is negative however and hence the reversal strategy does not perform the way it should based on the findings of de Bondt and Thaler (1985). On the contrary, Richards (1997) found evidence that the reversal effect was stronger for smaller markets than for bigger markets and hence for that reason it is not that strange that we do not find evidence in favour of the reversal strategy.

5.1.3 Volatility strategy

The final strategy that this analysis has tested against the traditional risk models is the strategy based on the one-year volatility effect (Soe, 2012). When implementing this strategy investors should take a long position in the stocks with the lowest volatility in the past 12 months and a short position in the stocks with the highest volatility in the past 12 months, for according to Soe the low volatile stocks outperform the high volatile stocks. In case the portfolios are held for one month it is shown that the volatility strategy performs in exactly the opposite way than it should. These results are given by the following table.

Table 12: Summary statistics volatility strategy, one-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1981-2013	-2.3730	-2.6361*	-2.3018	-2.5058*	-2.0772	-2.3585*	-2.1913	-2.4673*
1981-1996	-2.6140	-1.5900	-2.5530	-1.4274	-2.4238	-1.6226	-2.4887	-1.6668
1997-2013	-2.1474	-2.6311*	-2.0748	-3.0642*	-1.8806	-2.6213*	-1.9842	-2.6326*
1981-1989	-2.8245	-0.9842	-2.7170	-0.8791	-2.3366	-0.9014	-2.3245	-0.9384
1990-1997	-2.2177	-2.9845*	-2.3431	-2.9731*	-2.4377	-4.0803*	-2.3823	-3.6661*
1998-2005	-2.7068	-2.1764*	-2.6547	-2.4408*	-2.0471	-1.6402	-1.9878	-1.5923
2006-2013	-1.6914	-1.4486	-1.6083	-1.8955	-1.6992	-1.9807*	-1.7275	-2.0723*

**gives significance at the 5% level*

The spread and its significance are shown by the first two columns of table 12. It becomes clear that during the whole period the winners underperform the losers with 2.37% per month. This underperformance is mainly due to the period 1998-2005 where the winners underperform the losers with 2.71% per month. Moreover, the difference in performance regarding the whole sample period is significant and thus there is already some evidence which contradicts the findings of Soe (2012) for the losers are outperforming the winners. This contradiction remains when the market risk is taken into account as a risk factor, those results are shown by the columns three and four. The winners still underperform the losers over the whole period by 2.30% per month, which is largely due to 1998-2005 where the underperformance is equal to 2.65% per month. The results clearly indicate that the market risk is not able to fully explain the performance of this strategy throughout the whole sample period.

Next to the market risk, the Fama and French three-factor model also takes into account the size effect and value effect as risk factors, the results of that analysis are shown in the columns five and six of table 12. Although there are more risk factors trying to explain the performance, the strategy is still not fully explained throughout the whole sample period. As the results show, the winners underperform the losers with 2.08% per month. However, this is not any longer due to the period 1998-2005 because the volatility strategy is fully explained in this period. During the period 1990-1997 it is shown that the underperformance is equal to 2.44% per month, which is the main contributor to the underperformance of the winning stocks over the whole sample period.

Furthermore, when the momentum factor is also taken into account as a risk factor the conclusion regarding the performance of the volatility strategy remains the same. This is shown by the last two columns of table 12. It becomes clear that the winners keep underperforming the losers throughout the whole sample period with 2.19% per month. This is again mainly caused by the period 1990-1997 where the underperformance per month is equal to 2.38%. The four risk factors are together not able to fully explain the performance of the volatility strategy for this strategy has negative abnormal returns throughout the whole period.

Lastly, volatility can also be used as a measure for risk and those results are shown by the first two columns of table 4 (pag.17). It becomes clear that there is no evidence in favour of the winners outperforming the losers or that they are better compensated for the risk they take. Therefore, the volatility strategy does not work when the investment horizon is equal to one month for the winners are underperforming the losers during the whole sample period and because there is no proof of the winners being better compensated. These results clearly

contradicts the findings of Soe (2012), where it is advised to take a long position in the low volatile stocks.

The one-year volatility strategy is also tested when investors have an investment horizon equal to three months. Again it is shown that the winners keep underperforming the losers during the whole sample period and this underperformance is even larger when the portfolios are held for a longer time. Those results are depicted by the following table.

Table 13: Summary statistics volatility strategy, three-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1981-2013	-6.8358	-2.4217*	-4.5996	-1.8515	-4.6847	-2.1174*	-5.8252	-2.5367*
1981-1996	-8.0165	-1.5702	-5.3932	-1.1613	-5.6056	-1.6640	-6.5908	-1.6012
1997-2013	-5.7245	-2.1913*	-3.7997	-2.1486*	-3.7457	-2.4178*	-4.9639	-2.9150*
1981-1989	-8.7008	-0.9828	-5.8995	-0.6901	-3.5516	-0.6366	-6.1433	-0.9065
1990-1997	-6.6730	-2.9302*	-5.0823	-2.7034*	-7.6242	-6.6660*	-7.7201	-5.5003*
1998-2005	-6.7659	-1.9285	-5.6976	-2.2130*	-6.4346	-3.0825*	-6.4448	-2.5333*
2006-2013	-4.9703	-1.1676	-2.8204	-1.1859	-2.4701	-1.2195	-2.7291	-1.2451

**gives significance at the 5% level*

The first two columns show that, during the whole sample period, the winners underperform the losers with 6.84% in the three months after portfolio formation. The difference in performance is regarded as significant and hence this is already some evidence which contradicts the findings of Soe (2012) with regards to the volatility strategy, for the losers are outperforming instead of the winners. However, when the market risk is taken into account it is shown that throughout the whole sample period the volatility strategy does not perform abnormally and hence the market risk is able to explain the returns made. These results are given by the columns three and four of table 13. On the contrary, during the periods 1997-2013, 1990-1997 and 1998-2005 the volatility strategy is able to perform abnormally in the presence of market risk as factor. Please note that this abnormal performance in all three periods is negative and thus the volatility strategy still performs exactly in the opposite way it should. The underperformance of the winners in the next three months in these periods fluctuates from 3.80% to 5.70%.

Further, when the size effect and value effect are also taken into account as risk factors the volatility strategy is still unable to perform positively throughout the whole sample periods. This evidence is provided by the fifth and sixth column of table 13. During the whole sample period the long position in the low volatile stocks would have resulted in a loss of 4.68% every three months, this loss is even bigger in the period 1990-1997 where the loss is equal to 7.62% every three months. It shows that the volatility strategy performs worse than can be explained by the three risk factors.

It might be that a fourth risk factor is indeed able to explain the performance of the volatility strategy, the results of this analysis are shown in the last two columns of table 13. This is however not the case for the volatility strategy is even performing worse with the fourth risk factor taken into account. There is evidence found that this strategy, when implemented over the whole sample period, results in a loss of 5.83% every three months. This is mainly due to the bad performance in the period 1990-1997 where the losers are outperforming the winners with 7.72% in the next three months. Based on these results the advice is to go short in the winners instead of the losers, which contradicts the findings of Soe (2012). Nonetheless, keep in mind that these results are shown for portfolios consisting of the 500 largest companies in the United States.

Volatility can also be taken into account as a risk factor, which is represented by the Sharpe ratios and their significance in the columns three and four of table 4 (pag17.). These results also indicate that the winning stocks are not getting more compensated than the losers for the risk taken and thus there is still no evidence which confirms the findings of Soe in his 2012 paper.

Lastly, the one-year volatility strategy is also tested when investors have a horizon of six months. The results of this analysis are the same as for the other two holding periods, the volatility strategy keeps performing the other way around and this performance is even worse when the holding period is extended to six months. The results are shown in the following table.

Table 14: Summary statistics volatility strategy, six-month holding period

Period	P1-P10	T-value	α(CAPM)	T-value	α(3-factor)	T-value	α(4-factor)	T-value
1981-2013	-13.6637	-2.3704*	-9.2293	-2.1828*	-8.7029	-2.8952*	-12.1005	-3.2252*
1981-1996	-16.3867	-1.4979	-9.0846	-1.1651	-8.4472	-0.9756	-17.1815	-1.3304
1997-2013	-11.1008	-2.5993*	-8.8875	-2.9262*	-9.7483	-2.9067*	-11.8893	-3.5405*
1981-1989	-18.6753	-0.9805	-11.5412	-0.7242	1.2306	0.0648	-20.5960	-0.7258
1990-1997	-12.7560	-3.0468*	-7.4876	-1.8586	-11.5481	-4.5631*	-12.8353	-4.6518*
1998-2005	-13.9389	-3.3358*	-12.3910	-2.8974*	-15.7856	-4.2539*	-16.9729	-6.7239*
2006-2013	-8.6579	-1.0912	-6.1571	-1.2321	-4.3214	-1.2187	-6.3549	-1.3676

**gives significance at the 5% level*

The first two columns show that the winners keep underperforming the losers throughout the whole sample period, in this case the underperformance in the next six months is equal to 13.66%. This relatively big underperformance is caused by the sub period 1998-2005 when the winners are underperforming the losers every six months with 13.94%. This is already some evidence against the one-year volatility strategy, in that it should be wiser to go long in the high volatile stocks. The argument against the volatility strategy remains the same when the market risk is taken into account as a risk factor. For the market risk is unable to explain all the returns of this strategy throughout the whole sample period. The third and fourth column show that the implementation of the volatility strategy, when portfolios are held for six months, during the

whole sample results in a semi-annual loss of 9.23%. The biggest loss is made in the period 1998-2005 where the semi-annual abnormal return is equal to -12.39%.

The Fama and French three-factor model tries to explain the performance of this strategy by also taking into account the size effect and value effect as risk factors. Unfortunately, these three risk factors together are still unable to explain all returns made by this strategy. Its semi-annual negative returns over the whole period is equal to 8.70%, and this is even more negative in the period 1998-2005 where the loss in the next six months is equal to 15.79%.

The momentum factor can also be used as a risk factor, and this is done in the four-factor model of Carhart. These results are shown in the final two columns of table 14. It becomes clear that the evidence against the volatility strategy remains, even when having more risk factors trying to explain its performance. As can be seen from the last two columns, the volatility strategy is still able to perform abnormally bad throughout the whole sample period where the loss over a period of six months is equal to 12.10%. Moreover, the performance in the period 1998-2005 is still the worst one with a semi-annual loss of 16.97%. Even with an investment horizon of six months it is not wise to go long in the low volatile S&P 500 stocks, and thus the findings of Soe (2012) are not valid for the 500 biggest companies.

Lastly, one can also use volatility as a risk measure and those results are shown in the last two columns of table 4 (pag17.). It is shown that the winners do not significantly outperform the losers without having a higher volatility, and hence there is no evidence which tells us that the winning stocks are better compensated than the losing stocks. For this reason, the volatility strategy still does not work the way it should.

When looking at different investment horizons and different risk factors it has become clear that the one-year volatility strategy, where the investor takes a long position in low volatile stocks and a short position in the high volatile stocks, performs abnormally bad. Based on that, the advice is made to go long in the riskier stocks and short in the safer stocks when investing in the S&P500 stock universe. This advice confirms the expectations of the mean-variance framework, which states that risk should be compensated by higher returns and thus more risk results in more return.

5.2 Fundamental-based analysis

Throughout this subsection we will discuss the influence of the different fundamentals and dummy variables on the performance of the strategies for the three holding periods and all

testing periods. The momentum strategy is discussed first and thereafter the other two investment strategies are discussed.

5.2.1 Momentum strategy

In the previous subsection the momentum strategy was already discussed regarding the different traditional risk models in order to see if the performance could be fully explained by the various risk factors that can be taken into account. For this strategy it was shown that, in case the holding period is one month, it was unable to perform abnormally throughout the whole sample period when going long in recent winners and short in recent losers. Thus, in this period the strategy is not performing in the way it should based on earlier findings. Even though the momentum strategy is unable to deliver risk-adjusted excess returns, there might be some influence of various fundamentals on the returns of this strategy. The results of that analysis are given in the following table.

Table 15: Summary statistics momentum strategy fundamental explanation, one-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	1.0040	1.4139	0.0101	0.0704	0.2294	0.4267	3.9468	2.5969*
1981-1996	-0.9697	-1.7321	0.0731	0.6304	-0.7552	-1.1725	2.4878	1.9982*
1997-2013	2.4149	2.3105*	-0.1248	-0.3218	0.6500	0.8466	6.8598	1.8420
1981-1989	-0.9364	-1.2897	0.1618	1.2481	-0.6607	-0.8490	3.5980	1.8576
1990-1997	-0.6693	-0.7259	-0.1633	-0.7110	-0.3863	-0.3519	0.8681	0.5931
1998-2005	2.6366	1.5571	0.0909	0.1897	1.3022	1.0132	7.9925	1.2528
2006-2013	2.3131	1.7002	-0.7308	-1.2471	-0.1213	-0.1227	6.8526	1.2450

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	1.9771	1.0917	-0.7103	-0.4087	1.4118	1.0613	0.9527	1.0190
1981-1996	-2.1571	-2.2760*	0.9158	0.9676	-0.9767	-0.4616	0.4902	0.5905
1997-2013	6.0651	2.0961*	-2.2104	-0.7021	1.5485	1.0103	1.4663	0.9611
1981-1989	-3.2588	-2.7290*	1.2626	0.9536	-1.0076	-0.3383	0.7641	0.7611
1990-1997	-0.7163	-0.4144	0.5948	0.5345	-2.5378	-0.5571	-0.9707	-0.7455
1998-2005	7.9721	1.8813	2.1264	0.4954	24.3866	1.9160	1.4054	0.6601
2006-2013	4.5856	1.4673	-4.1144	-1.0804	0.0492	0.0304	2.1475	2.0137*

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	-0.3339	-0.3707	-0.5546	-0.7823	-0.0365	-0.0402
1981-1996	0.8525	0.8610	-0.9554	-1.3162	0.2641	0.3108
1997-2013	-1.1131	-0.8124	-0.4688	-0.3641	-0.5115	-0.3701
1981-1989	-0.1337	-0.0913	-0.5718	-0.5771		
1990-1997	1.9484	1.4614	-0.7936	-0.7499	0.9989	0.9021
1998-2005	-2.1221	-1.1176	-0.9519	-0.4055	-3.5283	-1.4937
2006-2013	-0.0214	-0.0149	-0.0779	-0.0539	1.2767	0.6508

**gives significance at the 5% level*

For the whole sample period the results show that only the growth in services has an impact on the monthly profits of the momentum strategy, the increase in momentum profits is 3.95% per month if services grow with a value of one. A more interesting result is the fact that growth in employment has a negative effect on the momentum profits in the period 1981-1996, and more specifically in the period 1981-1989 during Ronald Reagan's presidency. This negative impact might be explained by the so-called "Reaganomics" that created a lot of jobs while at the same time the inflation was decreasing significantly. Moreover, Reagan wanted to spur investments by lowering the marginal tax rate, which as a result should lead to higher employment and economic growth.

Furthermore, we also took a look at the effects of the macroeconomic fundamentals and dummy variables when those are taken into account simultaneously with controlling for the three sentiment types. The results of that analysis are given by table 17. It becomes clear that, with multiple fundamentals taken into account simultaneously, the services variable remains the only fundamental with a significant impact throughout the whole sample period. This impact is even bigger than in case the services fundamental is considered as separate variable, from a 3.95% monthly effect to a 4.19% monthly effect on the momentum returns. Moreover, the table shows that, throughout the whole sample period, both optimistic and pessimistic sentiment have a bigger impact on the monthly momentum returns than mild sentiment. This is further showed in table 16.

Lastly, the momentum strategy with a holding period of one month performs better during optimistic periods than pessimistic periods, which corresponds with our expectations. During mild periods the momentum strategy performs worse than in pessimistic periods in terms of both Sharpe ratio and the spread. The momentum strategy performs better in case the president is a member of the Democratic Party, in both Sharpe ratio and spread. These results are given by the following table and correspond with the full sample period.

Table 16: Performance difference of the sentiment periods and types of president, one-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1981-2013	0.1935	1.2907	0.1525	0.3906	0.0725	0.3014	0.1184	0.6148	0.1527	0.6514

Table 17: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of one month. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	0.7248	0.9616	-0.0828	-0.5208	0.1589	0.3090	4.1867	3.0833*
1981-1996	-1.1105	-1.4680	0.1629	1.2126	-0.8099	-1.3000	2.9369	2.3564*
1997-2013	2.5145	2.0205*	-0.3783	-1.1090	0.7375	0.9646	7.9300	2.6518*
1981-1989	-1.2323	-1.1500	0.2567	1.5477	-0.7075	-0.8787	3.5539	2.1195*
1990-1997	-0.5046	-0.4092	-0.1506	-0.5384	-0.0665	-0.0617	0.4316	0.2021
1998-2005	2.5286	1.1869	-0.5742	-1.1599	1.8395	1.4882	8.8435	1.9298
2006-2013	2.9334	1.9036	-1.0262	-1.9064	0.0113	0.0115	1.1857	0.2390

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	1.9662	1.1623	0.8340	0.5274	-0.9038	-0.4925	0.7786	0.7656
1981-1996	-1.2524	-0.7710	-0.3127	-0.2035	-0.6511	-0.1694	0.6130	0.5999
1997-2013	5.4232	1.8028	2.7822	0.9423	-2.5253	-0.9562	0.5959	0.2910
1981-1989	-1.8586	-0.8030	0.0869	0.0400	1.4752	0.2713	0.6783	0.4883
1990-1997	0.1643	0.0658	0.1298	0.0437	-4.6986	-0.6285	-0.4147	-0.2897
1998-2005	7.7454	1.6218	17.1877	3.1602*	31.3732	2.4386*	-1.7929	-0.5403
2006-2013	1.0204	0.2551	-5.6241	-1.5958	-2.2225	-0.7782	-3.1067	-0.3453

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1981-2013	0.5919	0.5523	-0.4241	-0.4462
1981-1996	0.7798	0.7725	-0.6418	-0.6304
1997-2013	1.3360	0.5775	0.2107	0.1124
1981-1989	-0.5909	-0.3537		
1990-1997	2.1656	1.4283	-0.4065	-0.2699
1998-2005	-0.6959	-0.1322	-4.0615	-1.2930
2006-2013	4.6517	1.5307	6.3177	1.8590

**gives significance at the 5% level*

The momentum strategy is also analysed when the holding period is equal to three months. The results in the previous subsection showed that the momentum strategy is performing abnormally during four testing periods, namely; 1981-2013, 1981-1996, 1990-1997 and 1998-2005. During the full sample period the momentum strategy with a three-month holding period would earn a risk-adjusted excess return of 3.80% over the next three months. In the other testing periods the risk-adjusted excess returns are also positive, hence during these years the momentum strategy is performing as it should. This performance might be affected or caused by different macroeconomic fundamentals, investor sentiment types and types of president. The results of that analysis are given in the following table.

Table 18: Summary statistics momentum strategy fundamental explanation, three-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	1.6571	1.3071	-0.0194	-0.0620	0.1281	0.1917	5.7082	2.0374*
1981-1996	-1.9179	-2.5702*	-0.0561	-0.2680	-2.1994	-2.0479*	1.8289	0.9003
1997-2013	3.8853	2.1842*	-0.0723	-0.0647	0.5669	0.6339	11.6907	1.8165
1981-1989	-2.4649	-2.7715*	0.0842	0.3838	-0.7874	-0.6232	3.8347	1.1418
1990-1997	-0.9375	-1.1301	-0.9976	-2.5255*	-3.3968	-1.6545	2.8730	0.7119
1998-2005	6.4481	2.4596*	0.5188	0.2508	3.0466	1.9367	12.3460	0.8426
2006-2013	3.1697	1.4052	-1.2792	-1.5140	-0.7298	-0.8281	15.1010	1.8406

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	5.0139	1.3901	-6.5974	-0.9350	3.3628	1.4765	2.2409	0.7424
1981-1996	-4.4466	-2.2045*	1.1782	0.4210	0.0456	0.0369	-0.0191	-0.0087
1997-2013	12.6933	2.4077*	-14.3896	-1.1194	5.7877	1.2883	4.6845	0.9747
1981-1989	-4.1706	-1.4322	1.4267	0.3288	0.6502	0.3821	0.6438	0.2424
1990-1997	-5.7568	-1.8310	1.5646	0.7830	-1.6961	-0.6464	-2.7343	-0.7929
1998-2005	23.4110	2.4372*	-1.7188	-0.3212	12.1835	1.2864	3.0240	0.5165
2006-2013	6.9479	1.8479	-18.1521	-1.0933	2.1549	0.6725		

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	-4.6027	-1.3768	2.0175	0.8192	0.0925	0.0303
1981-1996	-0.2475	-0.0696	0.1924	0.0799	-0.3568	-0.1818
1997-2013	-7.3754	-1.4709	2.9700	0.7774	-0.8398	-0.1923
1981-1989	-5.1232	-0.9318	2.7016	0.8008		
1990-1997	4.8705	1.6410	-1.6022	-0.5624	1.4363	0.5027
1998-2005	-8.6087	-1.0703	0.4781	0.0963	-11.2714	-2.1651*
2006-2013	-6.3055	-1.0702	6.3055	1.0702	6.0819	1.0329

**gives significance at the 5% level*

Again, we see that throughout the whole sample period only the services consumption variable has an impact on the returns of the momentum strategy, if the consumption in services grows the return of the momentum strategy over a three-month period increases with 5.71%. In the sub period 1981-1996 we see that only a few variables have a significant impact on the returns of the momentum strategy, however the results indicate that this impact is negative. Moreover,

the performance of the momentum strategy during this period becomes negative if there is growth in employment. We assume that this might be the case because of the implementation of Reaganomics in the first years of this time period, which is already explained in the analysis of the one-month holding period. For the other variables during this period the momentum strategy still remains profitable to implement. During the period 1990-1997 the results show that only the growth in durables is negatively influencing the returns of the momentum strategy, but this impact is not large enough to fully erase the positive abnormal performance of the momentum strategy, hence the strategy still performs in accordance with our expectations in this period. In the period 1998-2005 the growth in employment and industrial production are positively affecting the returns of the momentum strategy. This might be explained by the fact that during the 90's the policy of Bill Clinton resulted in continuous economic growth and the decrease in unemployment and because Clinton came with the North American Free Trade Agreement. Table 18 shows that, in the same period, the returns of the momentum strategy are negatively affected when the president is republican, thus during George W. Bush. This could be explained by the fact that he took office in the wake of the Dot-com bubble and its burst, but also because of the terrorist attacks that took place during his first term which affected the economy.

The influence of the fundamentals and dummy variables is also analysed when they are taken into account simultaneously. Those results are given by table 20 with controlling for the three types of investor sentiment. The results indicate that, as with the one-month holding period, throughout the whole sample period only services remains having a significant positive effect on the quarterly returns of the momentum strategy equal to 6.22%. The abnormal performance in the period 1981-1996 is not being affected by any of the fundamentals when they are taken into account simultaneously. This same conclusion is drawn for the period 1990-1997, for none of the fundamentals have a significant impact on the quarterly returns of the momentum strategy as showed in table 20. So, the performance in this period remains in accordance with earlier findings. We see that the business-cycle has a big positive influence on the quarterly abnormal returns in the period 1998-2005. This was also shown for the one-month holding period. Please note, with all fundamentals taken into account at the same time the effects are either insignificant or significantly positive which means that the abnormal performance in those periods remains. Thus, with a holding period of three months the momentum strategy is profitable to implement when investing in the S&P500 stock universe. Also, with all fundamentals considered the momentum strategy performs best throughout the whole sample period when sentiment is mild as can been seen in table 20.

The momentum strategy keeps having a better performance during optimistic periods than pessimistic periods, when the holding period is extended. On the contrary, it is shown that during mild periods the performance of the strategy is improved compared to pessimistic periods. Another contrarian result with the one month holding period is that the performance is better when the president is a member of the Republican Party. These results are given by the following table.

Table 19: Performance difference of the sentiment periods and types of president, three-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1981-2013	0.2945	4.3249	0.0929	-0.4797	0.2559	3.9705	0.1733	2.7995	0.4017	2.7070

Table 20: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of three months. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	0.6260	0.4282	-0.2874	-0.6739	-0.7848	-0.8140	6.2193	2.2550*
1981-1996	-2.4450	-1.7653	-0.0031	-0.0102	-1.3643	-0.8995	2.4457	0.9557
1997-2013	3.6767	1.4490	-1.4442	-1.1810	-0.7496	-0.5256	11.2633	1.4831
1981-1989	-5.7449	-2.8073*	0.1733	0.4980	-0.9752	-0.4819	3.7248	1.0013
1990-1997	1.9827	0.8069	-1.0091	-1.2517	-4.9316	-1.9654	7.0379	1.6549
1998-2005	7.9845	1.2422	0.2817	0.1455	-0.4188	-0.1028	16.7346	1.4694
2006-2013	2.1696	0.4293	-3.7184	-1.2205	-1.0280	-0.3354	12.1073	0.7100

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	2.5354	0.7029	-0.3618	-0.0609	-0.9176	-0.3232	-0.3689	-0.1055
1981-1996	-2.3219	-0.6143	-3.9179	-0.8135	1.5827	0.6622	1.9291	0.5816
1997-2013	5.9317	0.9080	8.8469	0.6718	-1.1995	-0.2143	-4.6820	-0.5803
1981-1989	4.4787	0.7894	1.6952	0.2412	6.7221	1.9125	-1.9798	-0.4420
1990-1997	-1.4102	-0.2625	15.7101	1.4930	-2.2590	-0.5302	-5.3642	-1.2527
1998-2005	16.5890	1.4140	61.7565	2.4794*	8.0512	0.7972	-11.8562	-1.0237
2006-2013	-3.0064	-0.2698	-24.6783	-1.3276	-6.8196	-0.6023		

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1981-2013	-2.7053	-0.7455	-2.9876	-0.8742
1981-1996	-0.1289	-0.0417	-3.6077	-1.0242
1997-2013	-4.2355	-0.4533	-3.0415	-0.4269
1981-1989	-8.7304	-1.7658		
1990-1997	9.5334	2.0458	-9.3365	-1.8658
1998-2005	-18.6621	-1.0509	-6.3314	-0.6384
2006-2013	-8.6962	-0.1996	-8.4051	-0.1858

**gives significance at the 5% level*

Finally, the momentum strategy is also tested when the holding period is equal to six months. The risk-based analysis showed that the momentum strategy was unable to perform abnormally throughout the whole sample period when the positions are held for six months. Only with the market risk taken into account as risk factor the performance was left unexplained in the period 1990-1997. The abnormal performance of the momentum strategy in that period could be affected by the macroeconomic fundamentals and dummy variables individually, the results of that analysis are given in the following table.

Table 21: Summary statistics momentum strategy fundamental explanation, six-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	-1.0703	-1.4002	0.2033	0.2853	-3.4937	-2.7800*	-5.2039	-1.3541

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	-3.8707	-2.0227	3.8788	1.6596	0.6574	0.3558	0.6673	0.2006

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1990-1997	10.6595	3.6801*	-8.5346	-3.1327*	0.5698	0.1122

**gives significance at the 5% level*

The results show that the risk-adjusted semi-annual return of 7.83% in the period 1990-1997 turns only to a negative value if during those same years the sentiment is mild. For the remaining fundamentals and dummy variables the influence is not big enough to make the momentum strategy loss-making during this period. On the contrary, during pessimistic periods the momentum strategy becomes even more profitable for the semi-annual return increases with 10.66%. Please note, these results are only shown when the market risk is the only risk factor. With more risk factors the strategy is unable to deliver excess returns.

Also, this research looked at the influence of all fundamentals and dummy variables when they are taken into account simultaneously. For the six-month holding period it turned out that three fundamentals had a correlation coefficient which we perceived as too high. Therefore, multiple multivariate regressions are run to account for those highly correlated fundamentals. Again, only results regarding the period 1990-1997 are shown (full tables can be found in Appendix D) in the following three tables.

Table 22: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of six months, controlled for industrial production. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	-1.3708	-0.5762	0.6349	0.6262	-2.7236	-1.3759	-8.6435	-2.3929*

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	3.0729	0.2398	6.1739	1.1965	16.4662	3.8414*	-2.4284	-0.4860

**gives significance at the 5% level*

Table 23: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of six months, controlled for employment. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Services		Employment	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	0.5657	0.6699	-2.0296	-1.1821	-9.2693	-2.8060*	-4.5830	-1.3621

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	1.5096	0.1504	5.7422	1.5394	16.6909	4.3076*	-2.9444	-0.6524

**gives significance at the 5% level*

Table 24: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of six months, controlled for GDP. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Business-cycle		GDP	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	0.3488	0.2879	-4.8062	-2.5603*	26.6487	1.6137	2.7423	0.5643

**gives significance at the 5% level*

Period	Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value
1990-1997	1.0711	0.2175	15.2202	2.5009*	-7.6615	-1.4957

**gives significance at the 5% level*

The results show that the abnormal semi-annual performance in this period is negatively affected by services for both the industrial production and employment regression. In the GDP regression nondurables has a negative effect on the semi-annual returns of the momentum strategy. However, at the same time irrespective of the three isolated variables we see that pessimistic sentiment has a large significant impact on the six-month return which results in a total positive effect. Hence, the momentum strategy still remains profitable in this period. Furthermore, both optimistic and pessimistic sentiments have a larger positive effect on the semi-annual returns than the mild sentiment as indicated by the three tables when all fundamentals are taken into account during the period 1990-1997.

In case the holding period is equal to six months we see that the strategy is still performing best during optimistic periods. Moreover, similar to the three-month holding period the results indicate that the performance is worst when investors are pessimistic. To conclude, the strategy

is performing better when the president is a member of the Democratic Party. These results are given by the following table.

Table 25: Performance difference of the sentiment periods and types of presidents, six-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1981-2013	0.5621	10.4168	0.0538	-1.0288	0.4914	-3.2739	0.2262	-2.9212	0.9348	7.1297

5.2.2 Reversal strategy

For the reversal strategy it became clear in subsection 5.1.2 that this strategy was unable to deliver risk-adjusted excess returns for all testing periods when the holding period is equal to one month. All three traditional risk models were able to fully explain the performance of this strategy. However, we still further analysed this strategy by looking at the influence of the fundamentals and dummy variables on the returns of this strategy. Those results are given by the following table.

Table 26: Summary statistics reversal strategy fundamental explanation, one-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-1.2195	-1.4040	0.0811	0.4961	-0.4840	-0.7798	-0.2702	-0.0773

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-5.9537	-1.1709	0.4447	0.2198	-0.0337	-0.0185	-1.5405	-0.9616

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1982-2013	-1.2672	-0.8277	2.4081	1.1094	0.9853	0.5731

**gives significance at the 5% level*

The results show that throughout the whole sample period none of the fundamentals and dummy variables have an impact on the returns of the reversal strategy, thus the reversal strategy does not generate profits throughout the whole sample period when the investment horizon is one month. For all other sub periods it is shown that only the business-cycle in the period 1998-2005 is positively influencing the monthly return of the reversal strategy with 5.23% (Appendix D, table 32). In that same period the results indicate that growth in gdp has a massive negative impact on the monthly return of -25.88%, this could be explained by the fact that growth in gdp can be a proxy for the business-cycle. Thus, if gdp grows there is an expansion and people become more optimistic about the economy as a whole, and therefore expect recent winners to keep winning instead of the other way around. However, overall we

could say that the reversal strategy with a holding period of one month should not be implemented for the S&P500 stock universe.

Furthermore, this research also looked at the effects of the fundamentals and dummy variables in case they are taken into account simultaneously. The results are depicted in table 27, and show that the monthly returns throughout the whole sample period remain unaffected by any of the fundamentals, even when those fundamentals are taken into account simultaneously. Moreover, it shows that both optimistic and pessimistic sentiment have a more negative impact on the monthly returns than the mild sentiment. Also, in the period 1998-2005 the fundamentals GDP and business-cycle lose their effects on the monthly returns when all fundamentals are considered at the same time (Appendix D, Table 33).

Table 27: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of one month. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-1.1882	-0.6938	0.2057	0.5731	-0.7499	-0.6509	-0.7950	-0.2588

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-7.1238	-1.8251	-2.0407	-0.5504	1.9130	0.4636	-2.4847	-1.0955

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1982-2013	-3.1356	-1.2673	0.1910	0.0898

**gives significance at the 5% level*

For the reversal strategy it is also shown by table 28 that the performance is best during mild sentiment periods and worst during optimistic periods. Also, during Republican presidents the reversal strategy has a better performance. Those results are the exact opposite for reversal than for momentum, which is in line with the expectations.

Table 28: Performance difference of the sentiment periods and types of presidents, one-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1982-2013	-0.0556	-0.6015	-0.1650	-0.4635	-0.1678	1.8710	-0.1294	0.8550	-0.0596	-0.1302

The analysis in subsection 5.1.2 further showed that only with the three-factor model the reversal strategy is able to perform abnormally in the period 1990-1997 when the holding period is three months. However, in that period the reversal strategy delivers a quarterly risk-adjusted excess return of -3.55%, which is not the return we would expect to see when

compared to the findings of de Bondt & Thaler in 1985. The impact of the fundamentals and dummy variables, independently, on the quarterly return of the reversal strategy are given by table 29. The results show that in the period 1990-1997 only durables has a significant impact on the quarterly return of the reversal strategy, but this impact is not large enough to fully erase the negative quarterly risk-adjusted excess return of -3.55%. Hence, the strategy still does not deliver returns which are in line with our expectations.

Table 29: Summary statistics reversal strategy fundamental explanation, three-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	0.5163	0.6355	1.0237	2.1526*	1.1577	0.5673	-0.5067	-0.1598

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	4.8190	1.5385	-1.9475	-0.8378	4.2841	1.6420	-2.3808	-1.0324

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1990-1997	-3.3466	-0.9586	4.2955	1.6875	-2.5492	-1.2059

**gives significance at the 5% level*

The analysis is extended by looking how the fundamentals influence the quarterly returns when they are taken into account simultaneously. Those results are shown in the table 30. It turns out that throughout the whole sample period still none of the fundamentals and dummy variables is able to affect the quarterly returns of the reversal strategy (Appendix D, Table 35). Moreover, in the period 1990-1997 none of the fundamentals and dummies is able to tackle the negative quarterly risk-adjusted excess returns, thus the strategy delivers returns which contradicts the findings of De Bondt & Thaler (1985) and Jegadeesh & Titman (1993). For all other sub periods we find evidence that the overall effect on the quarterly returns is negative (Appendix D, Table 35). The results show that, as with the one month holding period, the mild sentiment has a more positive influence on the returns than the other two sentiments when all fundamentals are considered.

Table 30: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of three months. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	-0.1349	-0.0542	1.0223	1.2459	-0.1745	-0.0691	-0.0036	-0.0008

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	2.4782	0.4394	0.8299	0.0757	3.6132	0.8069	-2.9835	-0.6926

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1990-1997	-6.6161	-1.3512	1.7852	0.3396

**gives significance at the 5% level*

Table 31 shows that the performance remains best during mild periods and worst during optimistic periods. Moreover, the strategy performs best when the president is Republican. These results are similar to the results of the one-month holding period.

Table 31: Performance difference of the sentiment periods and types of presidents, three-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1982-2013	-0.1844	-2.9098	-0.1043	0.4903	-0.3182	4.2551	-0.1842	1.7763	-0.2205	-0.2399

Lastly, the reversal strategy is also analysed when the holding period is equal to six months. As with the three-month holding period, it was shown in subsection 5.1.2 that the reversal strategy only delivers risk-adjusted excess returns in the period 1990-1997 for the three-factor model. However, this semi-annual risk-adjusted excess return is equal to -7.27% which sign is in contradiction with earlier findings and our expectations. As with the other holding periods, this research also analysed the effects of the fundamentals and dummy variables independently on the returns of the reversal strategy. Those results are given by the following table.

Table 32: Summary statistics reversal strategy fundamental explanation, six-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	1.4573	1.1798	1.0394	1.0943	-0.9707	-0.2762	5.0982	2.2732*

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	4.0597	1.2738	-13.4636	-7.2224*	2.6431	0.7504	0.3643	0.0976

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1990-1997	-8.7502	-1.7553	6.4413	1.4147	-3.9281	-1.3055

**gives significance at the 5% level*

As with the other holding periods the results in Appendix D, table 36 show that none of the fundamentals and dummy variables are affecting the returns of the reversal strategy throughout the whole sample period. Thus, the strategy remains unprofitable during the full sample period which contradicts earlier findings of De Bondt & Thaler (1985). In the period 1990-1997, when the strategy is able to deliver risk-adjusted excess returns, table 32 shows that two fundamentals affect the semi-annual returns of the strategy. Of these two fundamentals, only services has a positive effect on the semi-annual return, but overall the semi-annual risk-adjusted excess return remains negative. More interestingly, in that same period also the

business-cycle is influencing the returns of the reversal strategy but in the opposite direction than what we would expect. We assume that this might be the case due to the Asian financial crisis in 1997, which also affected the economy and stock markets in the United States. In all other sub periods Appendix D, table 36 shows that the overall effect of the fundamentals and dummy variables on the semi-annual return is negative.

Lastly, we also looked at the effects of the fundamentals and dummy variables when they are taken into account simultaneously. The results of that analysis are given by the tables 33-35, in which is controlled for the three highly correlated variables/fundamentals. The results show that the abnormal performance in the period 1990-1997 is not affected by the fundamentals and dummy variables when they are taken into account simultaneously, these results hold regardless for which fundamental the regression is controlled for. Moreover, mild sentiment has a more positive influence on the semi-annual return than the other two sentiments as is shown in tables 33-35. To conclude, with a six-month holding period the reversal strategy is unable to deliver a semi-annual risk adjusted excess positive return during all testing periods.

Table 33: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of six months, controlled for industrial production. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	0.3451	0.0578	1.9097	0.7507	-2.5403	-0.5115	8.7813	0.9689

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	7.2234	0.2247	-8.3858	-0.6477	-18.1104	-1.6839	-0.0144	-0.0012

**gives significance at the 5% level*

Table 34: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of six months, controlled for employment. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Services		Employment	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	1.7185	0.7648	-4.3920	-0.9612	10.1914	1.1592	6.4463	0.7199

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	14.9360	0.5592	-10.0149	-1.0089	-18.0979	-1.7551	1.4507	0.1208

**gives significance at the 5% level*

Table 35: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of six months, controlled for GDP. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Business-cycle		GDP	
	β	T-value	β	T-value	β	T-value	β	T-value
1990-1997	2.7935	1.1617	-2.0795	-0.5582	8.1476	0.2486	5.4454	0.5646

**gives significance at the 5% level*

Period	Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value
1990-1997	-7.1597	-0.7324	-21.8026	-1.8051	9.3096	0.9157

**gives significance at the 5% level*

Evidence also showed that, no matter what investment horizon is chosen, the reversal strategy keeps performing best during mild periods and worst during optimistic periods. Further, when the different types of presidents are compared the results also indicate that the performance is best during republican presidents. This remains the same for the three different holding periods that are assumed throughout the analysis. The comparisons of the dummies for the six-month holding period are given in the following table.

Table 36: Performance difference of the sentiment periods and types of presidents, six-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1982-2013	-0.0810	-3.3377	-0.0051	2.5404	-0.5349	4.9015	-0.2297	4.1907	-0.7630	-1.2168

5.2.3 Volatility strategy

In subsection 5.1.3 the results show that the volatility strategy, with a holding period of one month, was able to perform abnormally throughout the whole sample period. In three more periods this strategy was also able to perform abnormally, namely 1997-2013, 1990-1997 and 2006-2013. However, the abnormal performance in all those periods is negative which contradicts the findings of Blitz & Van Vliet (2007) and Soe (2012). Throughout this section we analyse those periods and the effects of the different fundamentals and dummy variables on the monthly returns of the volatility strategy. The results of those effects are given by the following table.

Table 39: Summary statistics volatility strategy fundamental explanation, one-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-0.4734	-0.5954	-0.2754	-1.0417	-2.0521	-3.3838*	-3.9530	-1.2080
1981-1996	-0.1753	-0.1098	-0.2797	-1.0835	-1.6587	-1.4257	-6.8008	-1.6137
1997-2013	-0.6542	-0.7055	-0.2560	-0.4526	-2.2125	-3.1681*	-0.3745	-0.1221
1981-1989	0.6814	0.3242	-0.2260	-0.7457	-2.9639	-2.1738*	-7.6885	-1.6399
1990-1997	-2.1693	-1.6376	-0.4070	-1.6546	0.5959	0.5468	-5.1795	-2.4703*
1998-2005	-0.9526	-0.5796	0.1007	0.1436	-1.2350	-1.0095	2.1850	0.4794
2006-2013	-0.3790	-0.3190	-0.9863	-1.5846	-2.9073	-4.7769*	-3.4134	-0.6804

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	3.9264	0.7877	4.8983	2.6355*	-4.7096	-2.4794*	1.9465	1.2346
1981-1996	7.9576	0.7950	6.9001	2.6394*	-8.8084	-1.3308	4.0897	1.6430
1997-2013	0.1528	0.0434	3.0430	1.1346	-4.3360	-2.5847*	0.3778	0.2512
1981-1989	12.4082	0.7464	8.6489	2.1375*	-10.1787	-1.6092	5.4400	1.1850
1990-1997	2.0780	0.8394	3.7228	1.0617	-6.1049	-0.6799	1.5838	0.9727
1998-2005	-0.3386	-0.0592	8.1259	1.7476	-28.2734	-2.2469*	2.0704	1.0703
2006-2013	-0.2672	-0.0765	0.3906	0.1246	-3.2452	-1.9133	-0.6502	-0.6912

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	0.8923	0.6511	-2.4589	-1.1821	0.3463	0.2196
1981-1996	1.4735	0.6338	-3.9599	-1.2381	0.1243	0.0528
1997-2013	0.3788	0.2928	-0.8531	-0.8140	0.8116	0.5887
1981-1989	3.7239	1.0237	-6.7403	-1.1691		
1990-1997	-0.6912	-0.4248	-0.6216	-0.4755	0.5391	0.3459
1998-2005	-2.9754	-1.5306	-1.4470	-0.7630	0.9105	0.3648
2006-2013	0.4002	0.3367	-0.3761	-0.3151	1.6130	0.9753

**gives significance at the 5% level*

Regarding the full sample period the results show that only three fundamentals have a significant impact on the monthly return of the strategy. The direction of the impact of those fundamentals is exactly what we would expect to see. For example the business-cycle has a positive influence on the monthly return, this could be explained by the risk-averse behaviour of investors during uncertain times. As a result, the low-volatility stocks should yield higher returns than the high-volatility stocks. Please note that in the full sample period the overall monthly return of the strategy turns positive when times are identified as a recession. For the other two fundamentals the monthly return of the strategy becomes even more negative. In the period 1997-2013 the results show that again gdp and nondurables have a negative impact on the monthly return, thus the performance remains negative during this time period. For the remaining periods (1990-1997 & 2006-2013) the table indicates that the abnormal performance of the strategy remains negative, and hence the less-risky stocks do not outperform the risky stocks but underperform with regards to their peers.

We further analysed the impact of these fundamentals and dummy variables when they are taken into account simultaneously. The results are shown by table 40. It is indicated in the table that during the whole sample period the negative abnormal return is not being affected by any of the fundamentals, when those are considered all together. During that same period, the mild sentiment has the lowest impact on the monthly abnormal return of the three sentiment types. In the period 1997-2013 only nondurables keeps having a negative impact on the monthly abnormal negative return, causing it to become even more negative. In the remaining significant periods, 1990-1997 & 2006-2013, there are some fundamentals with a significant impact on the monthly abnormal return but this impact has a negative sign causing the volatility strategy to deliver a negative monthly return. Only in the period 2006-2013 we see that optimistic sentiment has a worse impact on the monthly return than mild sentiment. To conclude, the volatility strategy with a one-month holding period shows results which contradict earlier findings in the existing literature.

Table 40: Results of the multivariate regression with the spread of the volatility strategy as dependent variable and a holding period of one month. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	1.4790	0.9316	-0.2013	-0.6035	-1.5630	-1.4367	-3.2190	-1.1283
1981-1996	2.3662	0.7525	-0.4106	-0.7412	-0.7439	-0.2824	-7.0027	-1.3589
1997-2013	0.9502	0.7628	-0.0987	-0.2891	-1.8254	-2.3854*	1.4169	0.4734
1981-1989	4.1883	0.7606	-0.4534	-0.5378	-2.0884	-0.4940	-7.2007	-0.8422
1990-1997	-2.2199	-1.5331	-0.7151	-2.1762*	1.9435	1.5372	-5.4127	-2.1583*
1998-2005	1.1758	0.5169	0.0488	0.0924	-0.9676	-0.7332	6.8088	1.3916
2006-2013	1.3635	0.9350	-0.7670	-1.5058	-2.7147	-2.9283*	-5.9207	-1.2611

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	6.5897	1.8524	6.1744	1.8580	-1.5125	-0.3926	2.8990	1.3575
1981-1996	9.6351	1.4356	11.8514	1.8642	3.1824	0.2004	5.2395	1.2435
1997-2013	1.7367	0.5768	1.5386	0.5206	-3.4412	-1.3017	0.8711	0.4250
1981-1989	12.8221	1.0871	16.9563	1.5132	2.5744	0.0924	7.5085	1.0630
1990-1997	3.6976	1.2612	0.3786	0.1086	-1.1241	-0.1280	2.4102	1.4339
1998-2005	3.4471	0.6760	3.6644	0.6310	-30.5670	-2.2253*	0.9850	0.2780
2006-2013	1.6170	0.4272	-4.0009	-1.1997	-0.5713	-0.2114	-2.6275	-0.3086

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1981-2013	1.8952	0.8382	0.8286	0.4143
1981-1996	3.5341	0.8393	-0.4250	-0.1011
1997-2013	0.3920	0.1693	0.5095	0.2716
1981-1989	3.8262	0.4346		
1990-1997	0.7010	0.3937	0.5989	0.3386
1998-2005	-0.4560	-0.0811	1.6717	0.4985
2006-2013	2.6270	0.9135	4.5294	1.4084

**gives significance at the 5% level*

Lastly, it is shown in table 41 that the volatility strategy is performing best during optimistic periods and worst when investor sentiment is mild. Also, the volatility strategy seems to be performing better when the president is a member of the Republican Party. Nonetheless, the performance remains negative for all dummy variables.

Table 41: Performance difference of the sentiment periods and types of presidents, one-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1981-2013	0.0662	-1.0228	0.0041	-1.7337	0.0407	-3.8235	0.0798	-2.2372	-0.0733	-2.5834

The effect of the fundamentals and dummy variables is further analysed when the holding period is equal to three months. In subsection 5.1.3 we found evidence of abnormal performance in the periods 1981-2013, 1997-2013, 1990-1997 and 1998-2005, the quarterly returns during these periods are in contradiction with the findings of several papers such as Soe (2012), for we find negative quarterly abnormal returns. As such, we further analyse these returns by looking at the individual effects of the fundamentals and dummy variables during the before mentioned testing periods. The results of that analysis are given by the following table.

Table 42: Summary statistics volatility strategy fundamental explanation, three-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-0.9441	-0.9611	-0.2611	-0.4470	-2.5463	-3.1488*	-5.3063	-1.0943
1981-1996	-1.5001	-1.0287	0.7077	1.9186	1.0339	0.3879	-7.2677	-1.1075
1997-2013	-0.4840	-0.3321	-2.8191	-3.2693*	-3.2379	-4.7834*	-4.7742	-0.8038
1981-1989	-1.0375	-0.4965	1.0451	2.5196*	1.3875	0.2775	-9.9061	-1.3476
1990-1997	-1.9247	-1.6392	-0.9247	-1.0375	0.3402	0.1706	-8.7678	-2.3885*
1998-2005	-1.8637	-0.5855	-3.1722	-2.2173*	-2.2514	-1.2008	-15.2808	-2.3885*
2006-2013	-0.0823	-0.0475	-3.1600	-3.0935*	-3.6539	-5.6320*	4.0527	0.4279

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-5.0090	-0.9324	9.4016	1.4348	-5.5151	-1.8470	5.5041	1.1583
1981-1996	-9.6892	-1.1354	19.0690	2.4383*	-4.3411	-1.0782	11.0664	1.5692
1997-2013	-0.4795	-0.0820	-0.1042	-0.0110	-6.6951	-2.1213*	1.2483	0.2573
1981-1989	-12.6563	-1.0878	26.1549	2.2264	-4.8669	-1.0804	16.5392	1.3406
1990-1997	-2.5464	-0.6453	7.4527	1.0836	-2.8440	-0.4613	2.6740	0.6629
1998-2005	-2.4506	-0.1939	16.6667	4.4613*	-19.6979	-4.1181*	4.9112	0.8009
2006-2013	0.6015	0.1119	-7.0620	-0.5840	-1.7497	-0.4382		

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	3.5891	0.7670	-7.9467	-1.3288	2.0296	0.4087
1981-1996	10.0789	1.3115	-14.9306	-1.6825	-0.1633	-0.0235
1997-2013	-1.6802	-0.3518	0.4569	0.1342	5.1375	1.1237
1981-1989	19.5539	1.5303	-25.6026	-1.6816		
1990-1997	-0.0784	-0.0222	-1.9467	-0.6242	0.8734	0.3059
1998-2005	-11.1971	-1.7869	-0.6075	-0.1066	6.1441	0.8993
2006-2013	-1.1586	-0.2347	1.1586	0.2347	7.0312	1.0212

**gives significance at the 5% level*

It is shown that the abnormal performance throughout the whole sample period is only affected by the 'nondurables', in a negative way however. The quarterly return of the volatility strategy remains negative throughout the whole sample period when the investment horizon is three months. The same conclusion can be drawn for the period 1997-2013 for only three fundamentals have an impact on the quarterly return, but this impact makes the quarterly return even more negative. In the sub period 1990-1997 the table provides evidence that only 'services' has a significant influence on the three-month return of the volatility strategy, as with the previous two testing periods though the abnormal performance remains negative. In the final period we see that only 'business-cycle' is positively influencing the quarterly return of the volatility strategy. Moreover, during recessions in this period the strategy is able to deliver a positive return in the next three months. On the contrary, three other fundamentals independently have a negative impact on the already negative performance of the volatility strategy in this period.

The analysis is extended by looking at the effects of the fundamentals and dummy variables on the quarterly return when they are taken into account simultaneously. The results of that analysis are given by table 43.

Table 43: Results of the multivariate regression with the spread of the volatility strategy as dependent variable and a holding period of three months. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	2.6971	0.9251	-0.0316	-0.0372	-1.6033	-0.8340	-3.7586	-0.6834
1981-1996	4.3720	0.7155	0.8164	0.5971	5.3417	0.8175	-11.8748	-1.0458
1997-2013	1.8823	0.9588	-2.3165	-2.4475*	-2.4610	-2.2260*	-10.2875	-1.7742
1981-1989	16.6566	1.3906	1.4385	0.7155	14.3719	1.2473	-22.2568	-1.0235
1990-1997	-3.2962	-0.8747	-0.9018	-0.7258	4.1012	1.0728	-11.0229	-1.6590
1998-2005	1.7976	0.6070	-1.6378	-1.1605	-2.7183	-1.2705	-11.0201	-1.2587
2006-2013	-6.9705	-1.8488	-3.4222	-1.6162	-4.4065	-2.1919*	20.5794	1.5903

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-1.4254	-0.1982	5.4537	0.4605	-4.3514	-0.7686	10.0012	1.4349
1981-1996	-19.5629	-1.1930	19.6835	0.9212	3.5226	0.3324	16.5915	1.1806
1997-2013	3.8510	0.7592	-24.2904	-2.3834*	-8.6183	-2.0052*	8.5675	1.4131
1981-1989	-56.4279	-1.7543	39.0525	0.9730	-2.6913	-0.1340	34.3234	1.4186
1990-1997	-0.4460	-0.0522	-8.7834	-0.5291	-0.5107	-0.0753	6.3218	0.9691
1998-2005	8.7817	1.0190	-22.7817	-1.2568	-18.1473	-2.3240*	10.4908	1.1766
2006-2013	-7.6583	-0.9662	-34.9213	-2.4978*	6.6240	0.9189		

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1981-2013	5.9763	0.8259	7.5433	1.1069
1981-1996	10.7921	0.7871	1.4301	0.0952
1997-2013	-4.3391	-0.6446	5.9478	1.1212
1981-1989	10.8086	0.3714		
1990-1997	3.4199	0.4612	1.3309	0.1672
1998-2005	-5.4795	-0.4391	10.1497	1.3138
2006-2013	-3.5338	-0.2477	-10.3309	-0.6391

**gives significance at the 5% level*

As with the one-month holding period, the abnormal returns for the three-month holding period throughout the full sample are not affected by any of the fundamentals when put in a multivariate regression. For the period 1997-2013, the abnormal quarterly return is affected by the same three fundamentals as with the univariate regressions plus the business-cycle. However, all four fundamentals have a negative impact making the quarterly return even more negative. In the sub period 1990-1997, the abnormal return in the next three months remains negative for none of the fundamentals have a significant influence on the returns during this period when all considered at once. In the last significant period, 1998-2005, table 43 shows that only the fundamental GDP remains having an impact, however the impact is negative causing the volatility strategy to be loss-making during that time period. For the periods 1997-2013 & 1998-2005 the pessimistic sentiment has the worst impact of all three sentiments as is shown by the table. To conclude, the volatility strategy remains performing in the exact opposite direction than it should, even with the extended investment horizon.

Regarding the dummies and the performance of the strategy for each one of them the results are the same as for the one-month holding period. Again, the performance is best during optimistic periods and worst for mild sentiment periods. The strategy, with an extended holding period,

keeps performing better in periods when the president is a member of the Republican Party. These results are given by table 44.

Table 44: Performance difference of the sentiment periods and types of presidents, three-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1981-2013	0.0693	-2.9996	0.0869	-4.3071	0.0644	-11.5917	0.1201	-6.0362	-0.0902	-8.0658

Lastly, the effects of the fundamentals and dummy variables on the return of the volatility strategy are tested when the holding period is six months. Section 5.1.3 provided evidence that the strategy is able to deliver a semi-annual abnormal performance during the same testing periods as with the three-month holding period. Similar to that holding period the semi-annual returns are also negative for all those testing periods, thus the strategy still delivers returns that contradict the findings of Soe (2012). The results of the individual effects on the semi-annual return are given by the following table.

Table 45: Summary statistics volatility strategy fundamental explanation, six-month holding period

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-1.0081	-0.7597	-0.9846	-1.0340	-3.8460	-3.6111*	-4.8949	-0.6635
1981-1996	-2.2026	-0.7714	-0.3599	-0.2587	-4.6354	-0.9689	-11.1267	-0.7676
1997-2013	-0.2089	-0.1452	-1.5837	-1.6502	-3.6209	-5.7964*	0.0327	0.0061
1981-1989	-1.9200	-0.5052	0.3205	0.1878	-7.1272	-1.3619	-20.3237	-0.9128
1990-1997	-2.4593	-0.8818	-2.1870	-1.4660	2.8753	0.9693	-8.0906	-1.1264
1998-2005	-2.3427	-0.7281	0.6464	0.4411	-4.8271	-2.1531*	-7.4492	-1.0510
2006-2013	0.3450	0.1802	-2.3689	-2.1178*	-3.3122	-4.7070*	8.2570	0.9289

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-2.3362	-0.4288	16.5703	1.4742	-6.9084	-1.4532	6.4762	0.7731
1981-1996	-7.3926	-0.8776	39.0408	2.6345*	-10.9318	-1.1668	18.9399	1.5200
1997-2013	2.8434	0.4984	-2.2905	-0.2315	-4.2874	-1.7196	-1.8464	-0.2606
1981-1989	-8.3699	-0.6611	40.2392	1.5663	-12.4848	-1.1650	22.4179	0.9405
1990-1997	-3.2829	-0.5500	41.8985	15.0990*	-9.5930	-1.5519	10.3860	2.9456*
1998-2005	-13.5038	-3.4258*	10.7044	1.4410	-12.1189	-3.0790*	2.9297	0.2772
2006-2013	9.5215	1.6330	-12.3707	-0.7274	-2.3293	-0.5588		

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	1.9310	0.2285	-6.6396	-0.6192	2.4490	0.2519
1981-1996	3.9136	0.3001	-13.7117	-0.8908	-1.9888	-0.1451
1997-2013	-0.8817	-0.1060	3.0297	0.5450	8.8388	1.0499
1981-1989	5.9884	0.2691	-20.0976	-0.7396		
1990-1997	-0.5042	-0.0818	-6.0453	-1.1390	1.9943	0.4224
1998-2005	-23.2279	-4.0495*	3.9018	0.3498	11.1040	1.1339
2006-2013	-1.7001	-0.1940	1.7001	0.1940	12.5210	0.8910

**gives significance at the 5% level*

From the table it becomes clear that during the periods 1981-2013 and 1997-2013 only the fundamental 'nondurables' has a significant influence on the semi-annual return of the volatility strategy, in both periods the impact is negative resulting in an even more negative semi-annual return. In those periods the low-volatility stocks keep underperforming the high-volatility stocks which contradicts most of earlier findings regarding the volatility strategy. On the contrary, the performance of the strategy becomes positive in the period 1990-1997 due to the big impact of the fundamentals 'business-cycle' and 'optimism'. This effect might occur due to investors becoming more optimistic about low-volatile stocks during recessions and thus those stocks tend to outperform their peers. As with the first two testing periods, the performance of the volatility strategy remains negative in the period 1998-2005 for several fundamentals have a significant negative impact on the semi-annual return.

As final research we looked at the effects of the fundamentals and dummy variables when they are taken into account at the same time. Those results are given by tables 40-42 in Appendix D. The results show that, irrespective for which fundamental is controlled, the negative abnormal semi-annual return during the whole period is unaffected by any of the fundamentals when considered all together. During the period 1997-2013 we saw that only nondurables had an impact on the semi-annual return when the fundamentals are tested individually. Moreover, in the multivariate regressions we see that, controlling for all three variables, nondurables remains having an impact on the returns of the volatility strategy. When controlling for GDP the business-cycle also has a significant negative impact on the return in the next six months. All together, the negative performance of the strategy remains negative even though we control for all fundamentals simultaneously. For the period 1990-1997 the semi-annual return stays negative when we control for industrial production and GDP. On the contrary, when controlled for employment the results show that the business-cycle has such a large impact on the abnormal performance of the volatility strategy that it turns to a positive sign, making the volatility strategy during that period profitable. In the final significant period, 1998-2005, the results show that the negative semi-annual performance is only affected by nondurables when controlling for employment, but this effect causes the return in the next six months to decrease even further. In all, the volatility strategy with a holding period of six months is unable to deliver the returns as expected based on earlier findings. The recommendation is made to switch the positions taken by investors when considering the S&P500.

For the six-month holding period the results of the performance of the strategy with regards to the dummies remains the same as for the other two holding periods. During optimistic periods

the volatility strategy is performing best while the performance is worst during mild sentiment periods. Also, in times of republican presidents the strategy is showed to perform better.

Table 46: Performance difference of the sentiment periods and types of presidents, six-month holding period

Period	Optimistic		Pessimistic		Mild		Republican		Democratic	
	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10	S1-S10	P1-P10
1981-2013	-0.3873	-8.9537	-0.1178	-12.2301	0.2173	-17.1847	0.1604	-12.6989	-0.3620	-15.1479

6. Conclusion

The empirical results in the previous section provided evidence that the momentum strategy is profitable in the period 1998-2005 when the portfolios are held for one month. The monthly returns in that time period are not affected by the traditional risk factors and the macroeconomic fundamentals, even when those are taken into account simultaneously. We do see that in some cases the abnormal return is being affected, but not in such a way that it causes the strategy to deliver a negative monthly return. These findings are consistent with earlier findings of, for example, Jegadeesh & Titman (1993). Moreover, the momentum strategy is able to deliver abnormal positive returns throughout the whole sample period when investors hold their portfolios for three months. The macroeconomic fundamentals are unable to affect the quarterly returns in such a way that the strategy becomes loss-making, both independently and simultaneously. The strategy is also highly profitable in the period 1990-1997, irrespective of the number of fundamentals that we took into account. In the period 1998-2005 the strategy is generating a quarterly loss when the president is a member of the Republican Party, however when all fundamentals are taken into account together the quarterly return remains positive. We also showed that the strategy generates losses in the period 1981-1996 when the growth in employment is only taken into account as fundamental. Nonetheless, as with the other periods the momentum strategy remains profitable in this period when the macroeconomic fundamentals are taken into account simultaneously. Lastly, we provided evidence that the momentum strategy is unable to deliver risk-adjusted excess returns in all testing periods when the portfolios are held for six months. The momentum strategy also delivers the highest returns during optimistic periods which confirms the findings of Antoniou, Doukas and Subrahmanyam (2013), irrespective of the holding period.

In the previous section it became clear that the reversal strategy is unable to generate risk-adjusted excess return in the various testing periods if the holding period is one month. We saw that the different traditional risk models were able to fully explain all returns made by this strategy. These results seem to contradict the findings of De Bondt & Thaler (1985). On the contrary, if portfolios are held for three months the results showed that the strategy is generating excess returns for the period 1990-1997 when tested against the three-factor model. The quarterly excess returns are negative in that period and none of the fundamentals, independently and altogether, affect the return in such a way that it becomes positive. Even though the strategy manages to perform abnormally, it is of the opposite sign than expected. The reversal strategy also generates risk-adjusted excess returns in the period 1990-1997 if the portfolios are held for six months, again when tested against the three-factor model. As with the

three-month holding period, the performance is negative and remains negative when several macroeconomic fundamentals are taken into account independently and simultaneously. Regardless of the holding period, the reversal strategy seems to perform better in pessimistic periods than in optimistic periods. At first sight, this might seem to contradict the findings of Antoniou, Doukas and Subrahmanyam (2013), however the reversal strategy is also called the contrarian strategy and thus the performance of the reversal strategy should be the exact opposite of the momentum strategy. Thus, our findings still confirm the results of Antoniou, Doukas and Subrahmanyam (2013).

For the final strategy the results showed that the performance in the periods 1981-2013, 1997-2013, 1990-1997 and 2006-2013 is not affected by the traditional risk factors. When the portfolios are held for one month the volatility strategy is able to deliver a monthly risk-adjusted excess return, unfortunately its monthly return is negative. We further saw that the monthly return throughout the whole period becomes positive when only the business-cycle fundamental is taken into account, while it remains negative for all other fundamentals. In the other three periods the monthly return remains negative for all fundamentals, and in all four periods the montly return is negative when those variables are taken into account simultaneously. Thus, our findings of the volatility strategy with a one-month holding period contradict the findings of Soe (2012) and even more so the findings of Blitz, Pang and van Vliet (2013). Regarding the other two holding periods the results also showed that the volatility strategy delivers negative returns throughout the whole sample period. The fundamentals are not affecting the returns enough to make the volatility strategy profitable. For both remaining holding periods there are only a few exceptions where the performance turns positive, but as with the one-month holding period the strategy delivers negative returns in the majoritity of the cases. Regardless of the holding period, our results seem to contradict the findings of most papers about the volatility effect on stock returns. However, our findings do confirm expectations based on the mean variance framework. In this framework it is assumed that returns could be a reward for risk, thus the high-risk stocks should outperform the low-risk stocks. Moreover, volatility can be used as a measure of risk and therefore our findings indeed show that return could be a reward for risk.

Nonetheless, there might be some pitfalls in the empirical analysis throughout this paper. The portfolios consist of only S&P500 stocks that had available return data at the time of construction. Moreover, most advice given to investors is that they should diversify among different assets or countries, thus it might be that the results are more complete when the portfolios do not only consist of S&P500 stocks but also stocks from other stock exchanges.

Another drawback might be the fact that for the monthly gdp growth rate we assumed an equally monthly growth rate based on the quarterly growth rate, while this does not have to be the case. The fact that we only assumed holding periods of one month, three months and six months can also be a limitation to the emipirical research conducted throughout this paper. Earlier research showed that the evaluation period of investors should be equal to 12 months if they want to be indifferent between investing in stocks and investing in bonds (Benartzi & Thaler, 1995). This also means that the portfolios must be held for a period of 12 months. However, in this paper the longest holding period is six months which may not be representative for most real-life investors.

Throughout this paper we assumed that the transaction costs are equal to zero, while we know that this is not the case in real-life. Further, the assumption is made that the investors can short-sell without extra costs, while in reality there might be costs attached to short-selling or its bounded by legal constraints or applicability. Thus, our paper and its findings might be impossible to implement in practice or difficult to applicate.

To conclude, our findings still contribute to the main literature because both the momentum effect and reversal effect are hardly analysed for the S&P500 stock universe. Also, one of the main findings in this paper is highly contradicting the findings of Blitz, Pang and van Vliet (2013) who found that the low-volatility stocks also outperform in case the stocks are only S&P500 stocks. However, we find that this is not the case, as a matter of fact our findings indicate the exact opposite. So, the volatility effect might still be an anomaly which only holds for the smaller stocks. We further advice investors not to implement the reversal strategy when investing in S&P500 stocks for this strategy is highly inefficient. Also, we strongly recommend investors to take a long position in recent winners and a short position in recent losers if they hold their portfolios for three months. Our results indicate that, in this case, the momentum strategy is delivering a quarterly positive return throughout the whole period. Finally and most interestingly, irrespective of the holding period investors should go long in stocks with the highest past volatility and short in the stocks with the lowest past volatility. For this paper showed evidence in favour of high-volatility stocks during the whole sample period. Please note, all recommendations made apply to the S&P500 stock universe.

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Appendix A: Correlation matrices investment strategies

Throughout this section the correlation matrices are shown for the different strategies with regards to the different holding periods. The matrices show the degree to which the different portfolios are correlated with each other during the whole sample period. The one-month holding period matrices are shown first, thereafter the correlation matrices are shown for the three- and six-month holding period.

Correlation Matrix Momentum Portfolios, one-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.8662	0.7861	0.7088	0.6820	0.6338	0.5872	0.2074	0.5252	0.4699
P2			0.8940	0.8434	0.8286	0.7733	0.7220	0.2101	0.6593	0.5515
P3				0.9102	0.8968	0.8500	0.8050	0.2713	0.7444	0.6344
P4					0.9177	0.9115	0.8521	0.2891	0.8040	0.6887
P5						0.9211	0.8640	0.2831	0.8365	0.7230
P6							0.8824	0.2914	0.8706	0.7556
P7								0.2910	0.8582	0.7575
P8									0.2849	0.2813
P9										0.8943
P10										

Correlation Matrix Reversal Portfolios, one-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.3731	0.3472	0.3460	0.3235	0.3111	0.2969	0.2924	0.2765	0.2513
P2			0.9393	0.9209	0.8857	0.8517	0.8426	0.8063	0.7314	0.6118
P3				0.9401	0.9066	0.8790	0.8732	0.8287	0.7567	0.6367
P4					0.9142	0.9105	0.8912	0.8528	0.7890	0.6562
P5						0.9056	0.8948	0.8687	0.8067	0.6624
P6							0.9172	0.9002	0.8420	0.7320
P7								0.9168	0.8591	0.7608
P8									0.8975	0.7987
P9										0.8868
P10										

Correlation Matrix One-year Volatility Portfolios, one-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.7630	0.7192	0.6650	0.6731	0.6148	0.5878	0.5655	0.5023	0.1583
P2			0.9168	0.8985	0.8915	0.8619	0.8329	0.8099	0.7515	0.3186
P3				0.9272	0.9215	0.9080	0.8897	0.8678	0.8032	0.3415
P4					0.9392	0.9220	0.9070	0.8800	0.8271	0.3707
P5						0.9335	0.9176	0.9067	0.8592	0.4031
P6							0.9337	0.9276	0.8903	0.4165
P7								0.9424	0.9095	0.4226
P8									0.9249	0.4348
P9										0.4829
P10										

Correlation Matrix Momentum Portfolios, three-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.8765	0.7934	0.6927	0.6949	0.6300	0.6054	0.1987	0.5426	0.4647
P2			0.9068	0.8566	0.8548	0.8048	0.7892	0.2179	0.7164	0.6189
P3				0.9294	0.9194	0.8983	0.8644	0.2614	0.8172	0.7094
P4					0.9369	0.9375	0.8988	0.2918	0.8475	0.7489
P5						0.9477	0.9281	0.2825	0.8791	0.7654
P6							0.9555	0.3123	0.9087	0.8157
P7								0.3366	0.9238	0.8591
P8									0.3250	0.3347
P9										0.9219
P10										

Correlation Matrix Reversal Portfolios, three-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.4131	0.4181	0.3817	0.3293	0.3452	0.3405	0.2984	0.2841	0.2579
P2			0.9558	0.9431	0.9011	0.8660	0.8634	0.8221	0.7350	0.5898
P3				0.9591	0.9234	0.9105	0.9029	0.8659	0.8012	0.6799
P4					0.9304	0.9002	0.9018	0.8490	0.7702	0.6404
P5						0.9290	0.9385	0.8822	0.8133	0.6990
P6							0.9461	0.9172	0.8565	0.7556
P7								0.9179	0.8441	0.7241
P8									0.8970	0.8256
P9										0.8969
P10										

Correlation Matrix One-year Volatility Portfolios, three-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.7773	0.7451	0.6966	0.6733	0.6504	0.6007	0.5708	0.5188	0.1822
P2			0.9435	0.9188	0.9100	0.9000	0.8527	0.8146	0.7473	0.2788
P3				0.9578	0.9352	0.9307	0.8948	0.8758	0.8231	0.3346
P4					0.9552	0.9607	0.9421	0.9215	0.8771	0.3919
P5						0.9584	0.9299	0.9205	0.8775	0.4164
P6							0.9493	0.9353	0.8895	0.4310
P7								0.9528	0.9231	0.4416
P8									0.9496	0.4493
P9										0.4799
P10										

Correlation Matrix Momentum Portfolios, six-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.8944	0.7903	0.7409	0.7643	0.7035	0.6435	0.5650	0.6199	0.3992
P2			0.8895	0.8684	0.8691	0.8331	0.7685	0.7273	0.7309	0.4032
P3				0.9024	0.9123	0.9039	0.8615	0.7702	0.7991	0.3518
P4					0.9247	0.9314	0.8862	0.8272	0.8423	0.4513
P5						0.9351	0.9228	0.8512	0.9042	0.4907
P6							0.9343	0.8766	0.9027	0.4471
P7								0.8894	0.9264	0.4700
P8									0.9136	0.4852
P9										0.5288
P10										

Correlation Matrix Reversal Portfolios, six-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.4740	0.4716	0.4998	0.4812	0.3590	0.3493	0.3530	0.4157	0.3322
P2			0.9381	0.9474	0.9202	0.8774	0.8639	0.8612	0.8111	0.6882
P3				0.9678	0.9337	0.9127	0.8899	0.8868	0.8529	0.7591
P4					0.9498	0.9395	0.9127	0.9081	0.8707	0.7801
P5						0.9268	0.9316	0.9178	0.8949	0.7557
P6							0.9562	0.9365	0.9094	0.8138
P7								0.9465	0.9266	0.8380
P8									0.9330	0.8658
P9										0.8520
P10										

Correlation Matrix One-year Volatility Portfolios, six-month holding period

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		0.7888	0.7045	0.7074	0.6774	0.6439	0.5916	0.5573	0.4853	0.1954
P2			0.9464	0.9365	0.9181	0.8863	0.8565	0.8194	0.7447	0.3596
P3				0.9452	0.9400	0.9196	0.9094	0.8778	0.8306	0.4244
P4					0.9613	0.9366	0.9280	0.8958	0.8569	0.4179
P5						0.9455	0.9291	0.9158	0.8652	0.4757
P6							0.9459	0.9267	0.9050	0.4428
P7								0.9442	0.9310	0.4811
P8									0.9383	0.4932
P9										0.5215
P10										

Appendix B: Correlation matrices macroeconomic variables

In this section the correlation matrices for the different holding periods are provided. They show how much the macroeconomic variables are correlated with each other throughout the whole sample period. Please note that the decision is made to isolate variables from each other in the multivariate regressions when the correlation is at least 0.6.

Correlation Matrix macroeconomic variables, one-month holding period

	Durables	Employment	Industrial Production	Nondurables	Services	Gdp
Durables	1.0000	0.0890	0.1497	0.1593	0.1073	0.1466
Employment	0.0890	1.0000	0.2755	0.0484	0.0353	0.2775
Industrial Production	0.1497	0.2755	1.0000	0.1961	0.1812	0.4298
Nondurables	0.1593	0.0484	0.1961	1.0000	0.0786	0.2680
Services	0.1073	0.0353	0.1812	0.0786	1.0000	0.3221
Gdp	0.1466	0.2775	0.4298	0.2680	0.3221	1.0000

**gives correlation that is perceived as too high*

Correlation Matrix macroeconomic variables, three-month holding period

	Durables	Employment	Industrial Production	Nondurables	Services	Gdp
Durables	1.0000	0.2948	0.2143	0.1357	0.1627	0.3073
Employment	0.2948	1.0000	0.5661	0.2440	0.3183	0.5026
Industrial Production	0.2143	0.5661	1.0000	0.2252	0.2573	0.5517
Nondurables	0.1357	0.2440	0.2252	1.0000	0.2102	0.2253
Services	0.1627	0.3183	0.2573	0.2102	1.0000	0.5936
Gdp	0.3073	0.5026	0.5517	0.2253	0.5936	1.0000

**gives correlation that is perceived as too high*

Correlation Matrix macroeconomic variables, six-month holding period

	Durables	Employment	Industrial Production	Nondurables	Services	Gdp
Durables	1.0000	0.4099	0.4925	0.2907	0.4251	0.5721
Employment	0.4099	1.0000	0.7261*	0.2996	0.4657	0.6947*
Industrial Production	0.4925	0.7261*	1.0000	0.4708	0.2996	0.6734*
Nondurables	0.2907	0.2996	0.4708	1.0000	0.3162	0.4910
Services	0.4251	0.4657	0.2996	0.3162	1.0000	0.7092*
Gdp	0.5721	0.6947*	0.6734*	0.4910	0.7092*	1.0000

**gives correlation that is perceived as too high*

Appendix C: Summary statistics risk-based explanations

This section provides tables containing the results of the traditional risk models for the three strategies regarding the different holding periods.

Momentum strategy

Table 1: Results of the CAPM for the momentum strategy when the holding period is equal to one month. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the momentum strategy.

Period	α	T-value	βmarket	T-value
1981-2013	0.6224	1.4947	0.0110	0.1015
1981-1996	0.7898	2.0643*	0.1186	1.5926
1997-2013	0.4405	0.6061	-0.0703	-0.3739
1981-1989	0.7244	1.3855	0.1197	1.2346
1990-1997	0.7103	1.2080	0.0168	0.1364
1998-2005	1.2462	1.1036	0.0618	0.2033
2006-2013	-0.1874	-0.1893	-0.1616	-0.6221

**gives significance at the 5% level*

Table 2: Results of the Fama & French three-factor model for the momentum strategy with a holding period of one month. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the momentum strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1981-2013	0.8334	1.9062	-0.0072	-0.0600	-0.4183	-2.5418*	-0.3723	-1.6300
1981-1996	0.7550	1.8541	0.1496	1.9095	-0.2695	-1.2564	0.0165	0.1045
1997-2013	0.7143	0.9758	-0.0597	-0.2970	-0.4789	-2.0412*	-0.5255	-1.6110
1981-1989	0.7415	1.1815	0.1290	1.1857	-0.3298	-1.0122	-0.0509	-0.1954
1990-1997	0.6685	1.1197	0.0386	0.2753	0.0115	0.0489	0.0815	0.4649
1998-2005	2.4513	2.4088*	-0.3519	-1.2570	-1.0736	-4.4211*	-1.3709	-3.6741*
2006-2013	-0.1728	-0.1704	-0.2842	-0.9358	0.2615	0.6811	0.3353	0.8213

**gives significance at the 5% level*

Table 3: Results of the CAPM for the momentum strategy when the holding period is equal to three months. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the momentum strategy.

Period	α	T-value	βmarket	T-value
1981-2013	2.7615	2.2858*	0.0009	0.0041
1981-1996	2.9821	2.8611*	0.4813	3.3620*
1997-2013	2.1269	0.9530	-0.3012	-1.0756
1981-1989	2.5386	1.6623	0.5661	3.6892*
1990-1997	3.2772	2.3098*	0.2307	1.2328
1998-2005	4.4279	1.3189	-0.0197	-0.0479
2006-2013	0.2963	0.0934	-0.6473	-1.7564

**gives significance at the 5% level*

Table 4: Results of the Fama & French three-factor model for the momentum strategy with a holding period of three months. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the momentum strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1981-2013	3.7995	2.8067*	-0.1341	-0.8273	-0.1121	-0.3129	-0.6561	-2.6846*
1981-1996	3.5153	3.4118*	0.3390	2.2128*	0.3432	0.9423	-0.1486	-0.6725
1997-2013	3.2398	1.4525	-0.3488	-1.6534	-0.4384	-0.7987	-0.8189	-2.2370*
1981-1989	3.5492	1.9851	0.4060	3.2364*	0.1695	0.4429	-0.3168	-0.8467
1990-1997	4.2175	2.6827*	-0.0716	-0.2565	0.7793	1.9577	-0.0294	-0.1047
1998-2005	7.7335	2.8774*	-0.4820	-1.1038	-0.7999	-1.3224	-1.3747	-2.5957*
2006-2013	0.6495	0.2405	-0.5657	-1.7120	-0.7268	-0.6397	0.1565	0.3055

**gives significance at the 5% level*

Table 5: Results of the CAPM for the momentum strategy when the holding period is equal to six months. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the momentum strategy.

Period	α	T-value	βmarket	T-value
1981-2013	1.1791	0.2788	-0.0385	-0.1289
1981-1996	-1.5705	-0.2078	-0.2111	-0.3584
1997-2013	3.8544	1.0132	0.1371	0.9017
1981-1989	-9.9686	-0.7188	-0.3752	-0.4391
1990-1997	7.8272	3.6831*	0.1800	1.0429
1998-2005	8.8332	1.7112	0.6081	1.4493
2006-2013	-1.4937	-0.2375	-0.0440	-0.2884

**gives significance at the 5% level*

Table 6: Results of the Fama & French three-factor model for the momentum strategy with a holding period of six months. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the momentum strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1981-2013	3.9095	0.9256	-0.1196	-0.3207	-0.9914	-1.1810	-0.7024	-1.0528
1981-1996	1.0890	0.1529	-0.1300	-0.2238	-1.8467	-1.0528	-1.0749	-0.9584
1997-2013	5.2304	1.0536	0.0607	0.4263	-0.3209	-0.6490	-0.3537	-0.5232
1981-1989	5.0226	0.3292	-1.0399	-0.9035	-2.3121	-0.7391	-2.9926	-1.2668
1990-1997	6.9580	2.1106	0.2875	0.9007	-0.2063	-0.5271	0.1431	0.4736
1998-2005	13.3192	1.9714	-0.1156	-0.2048	-0.2932	-0.4454	-0.9189	-1.4638
2006-2013	1.4576	0.3647	-0.0543	-0.2025	-2.1122	-1.1197	1.7867	1.0439

**gives significance at the 5% level*

Table 7,8 and 9: Results of the Carhart four-factor model for the momentum strategy with a holding period of one, three and six month(s). The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB, HML, and MOM are the size, value and momentum factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the momentum strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1981-2013	0.6613	1.3699	0.0442	0.3671	-0.4286	-2.4160*	-0.3042	-1.0920	0.2055	1.0865
1981-1996	0.6679	1.5993	0.1474	1.8060	-0.2548	-1.1222	0.0381	0.2378	0.1099	0.8144
1997-2013	0.5561	0.7447	0.0381	0.1846	-0.5194	-2.0634*	-0.4532	-1.1709	0.2264	1.0029
1981-1989	0.7195	1.1011	0.1287	1.1599	-0.3292	-0.9960	-0.0434	-0.1649	0.0303	0.1779
1990-1997	0.5586	0.9904	0.0336	0.2351	0.0494	0.1937	0.0919	0.5362	0.1254	0.6903
1998-2005	2.3689	2.3384*	-0.3102	-0.9786	-1.0993	-4.2399*	-1.3518	-3.3702*	0.0789	0.4071
2006-2013	-0.2192	-0.2601	-0.0893	-0.3684	0.2424	0.6773	0.7518	1.7682	0.6800	2.4107*

**gives significance at the 5% level*

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1981-2013	0.0321	0.0284	0.1535	1.1230	0.3518	1.1943	-0.1210	-0.5620	1.4330	5.4493*
1981-1996	1.2619	1.3063	0.2272	2.0800*	0.7193	2.8313*	0.1328	0.7397	0.9765	5.3736*
1997-2013	-0.5469	-0.3848	0.2249	1.0559	0.0263	0.0584	-0.2796	-0.9814	1.5542	4.9940*
1981-1989	1.7526	1.1443	0.3146	2.5210*	0.4600	1.2449	0.0092	0.0273	0.7736	2.1934*
1990-1997	0.8969	0.5396	-0.0251	-0.1075	1.0994	4.1984*	0.1520	0.7142	1.1373	7.0201*
1998-2005	1.3160	0.5176	0.3453	0.5988	-0.2979	-0.5319	-0.6104	-1.2228	1.4480	3.1960*
2006-2013	0.2301	0.1623	-0.1783	-1.2412	-0.3952	-0.8214	0.9760	2.1365*	1.7054	5.4187*

**gives significance at the 5% level*

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1981-2013	-3.4678	-1.0267	0.0451	0.1320	-0.5461	-0.7446	-0.2799	-0.6093	1.5985	5.7946*
1981-1996	-9.7410	-0.8828	-0.4492	-0.6200	-0.8031	-0.6355	-0.1929	-0.2712	2.2546	1.7046
1997-2013	-1.3748	-0.7513	0.5319	3.5107*	0.0448	0.1583	-0.1260	-0.5819	1.5673	11.1005*
1981-1989	-20.7308	-1.0574	-0.7736	-0.6799	-1.7875	-0.6947	-0.1723	-0.0983	3.7704	1.6267
1990-1997	4.5694	1.2014	0.1947	0.6513	0.1437	0.4444	0.2890	0.8944	0.5060	1.6212
1998-2005	0.9925	0.4584	0.7921	1.8044	-0.1009	-0.3751	-0.2756	-1.1120	1.5366	10.5192*
2006-2013	-1.5685	-0.7374	0.3054	3.1042*	-0.2359	-0.3657	1.1088	3.9327*	1.4500	14.6003*

**gives significance at the 5% level*

Reversal strategy

Table 10: Results of the CAPM for the reversal strategy when the holding period is equal to one month. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the reversal strategy.

Period	α	T-value	βmarket	T-value
1982-2013	0.5210	0.5172	-0.0950	-0.9079
1982-1997	1.1769	0.6209	-0.1600	-1.1848
1998-2013	-0.0906	-0.1170	-0.0562	-0.3199
1982-1989	3.0629	0.8345	-0.2428	-1.1184
1990-1997	-0.7602	-1.3761	-0.0047	-0.0408
1998-2005	-0.4482	-0.3738	-0.1853	-0.7371
2006-2013	0.2205	0.2522	0.0742	0.2795

**gives significance at the 5% level*

Table 11: Results of the Fama & French three-factor model for the reversal strategy with a holding period of one month. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the reversal strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1982-2013	0.3329	0.3463	-0.0365	-0.3101	0.1590	0.5605	0.3967	1.7817
1982-1997	0.8547	0.5312	-0.0128	-0.1007	-0.5543	-0.8800	0.3568	0.8172
1998-2013	-0.3483	-0.4765	-0.1102	-0.5855	0.5469	2.6661*	0.4331	1.6401
1982-1989	2.5347	0.8240	-0.0414	-0.1433	-1.2612	-0.8257	0.3632	0.4545
1990-1997	-0.8681	-1.6399	0.0544	0.3875	-0.0730	-0.3407	0.1886	0.8943
1998-2005	-1.2972	-1.2255	0.0601	0.2417	0.8427	3.6040*	0.9118	2.9296*
2006-2013	0.1918	0.2131	0.0984	0.3248	0.0613	0.1694	-0.1795	-0.5163

**gives significance at the 5% level*

Table 12: Results of the CAPM for the reversal strategy when the holding period is equal to three months. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the reversal strategy.

Period	α	T-value	βmarket	T-value
1982-2013	0.8677	0.3035	0.0445	0.1772
1982-1997	2.5080	0.5039	-0.0821	-0.3264
1998-2013	-0.5168	-0.2087	0.1033	0.2862
1982-1989	7.4061	0.7447	-0.0194	-0.0456
1990-1997	-2.2809	-1.9435	-0.1789	-0.7858
1998-2005	-1.9355	-0.5460	-0.3217	-0.6033
2006-2013	0.3726	0.1274	0.5695	1.4898

**gives significance at the 5% level*

Table 13: Results of the Fama & French three-factor model for the reversal strategy with a holding period of three months. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the reversal strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1982-2013	-0.6756	-0.2610	0.2816	1.2179	0.0412	0.1160	1.0649	3.5002*
1982-1997	-0.1984	-0.0527	0.3728	0.8272	-0.2034	-0.5114	1.1304	1.6646
1998-2013	-1.6515	-0.7656	0.2127	0.7579	0.2774	0.5319	1.0231	3.1025*
1982-1989	2.7872	0.3924	0.6301	0.7371	-0.1876	-0.2348	1.6524	1.1222
1990-1997	-3.5456	-3.8194*	0.0853	0.4801	-0.1611	-0.3643	0.6370	3.0510*
1998-2005	-4.8136	-1.9144	0.2713	0.5769	0.3533	0.5499	1.4064	3.7973*
2006-2013	0.1528	0.0603	0.4149	1.4336	0.7264	0.7663	0.1831	0.6438

**gives significance at the 5% level*

Table 14: Results of the CAPM for the reversal strategy when the holding period is equal to six months. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the reversal strategy.

Period	α	T-value	βmarket	T-value
1982-2013	2.0905	0.4332	-0.0240	-0.0641
1982-1997	4.3368	0.5196	0.1747	0.2619
1998-2013	-0.5545	-0.1435	-0.2639	-0.9938
1982-1989	14.7762	0.8569	0.2451	0.2420
1990-1997	-5.7747	-1.7018	0.0511	0.1282
1998-2005	-2.2318	-0.5376	-1.1864	-2.5192*
2006-2013	1.0741	0.1716	0.1558	0.8639

**gives significance at the 5% level*

Table 15: Results of the Fama & French three-factor model for the reversal strategy with a holding period of six months. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the reversal strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1982-2013	-1.5823	-0.4066	0.1159	0.2917	1.2486	1.3026	1.0961	1.6658
1982-1997	1.8803	0.1807	0.0179	0.0400	2.6816	1.0376	1.7904	1.4127
1998-2013	-2.5117	-0.6265	-0.1326	-0.7511	0.3964	0.9697	0.5818	1.1165
1982-1989	7.9531	0.3308	0.1541	0.1260	4.5928	0.8358	3.0840	0.8744
1990-1997	-7.2705	-2.7152*	0.0869	0.3242	0.5370	1.1653	0.8682	3.4611*
1998-2005	-5.3799	-1.1245	-0.6527	-1.3620	0.1584	0.3314	0.6740	1.5284
2006-2013	-2.3105	-0.6014	0.1236	0.6094	2.5195	1.5289	-1.0855	-0.7965

**gives significance at the 5% level*

Table 16, 17 and 18: Results of the Carhart four-factor model for the reversal strategy with a holding period of one, three and six month(s). The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB, HML, and MOM are the size, value and momentum factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the reversal strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1982-2013	0.4992	0.5278	-0.0859	-0.7411	0.1709	0.5760	0.3386	1.4056	-0.1915	-1.3522
1982-1997	0.9982	0.6000	-0.0066	-0.0509	-0.5832	-0.9012	0.3379	0.7891	-0.1796	-0.9445
1998-2013	-0.1703	-0.2507	-0.2486	-1.3225	0.6210	2.8547*	0.3433	1.1550	-0.2909	-1.6807
1982-1989	2.4916	0.8170	-0.0429	-0.1509	-1.2638	-0.8231	0.3694	0.4567	0.0584	0.1759
1990-1997	-0.6543	-1.3369	0.0642	0.4785	-0.1468	-0.6040	0.1684	0.8472	-0.2439	-1.3539
1998-2005	-1.1549	-1.1966	-0.0119	-0.0433	0.8871	3.5719*	0.8787	2.7706*	-0.1363	-0.9742
2006-2013	0.2331	0.3053	-0.0753	-0.2920	0.0783	0.2299	-0.5509	-1.6648	-0.6063	-2.5026*

**gives significance at the 5% level*

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1982-2013	2.5026	1.0114	0.0300	0.1381	-0.3215	-0.9837	0.6527	2.0880*	-1.1699	-5.4106*
1982-1997	2.2664	0.4924	0.4614	0.9167	-0.5258	-1.2474	0.8799	1.5153	-1.0188	-1.9715
1998-2013	1.4333	0.8458	-0.3031	-1.5861	-0.1349	-0.2869	0.5576	1.8643	-1.3414	-4.8676*
1982-1989	5.7907	0.6959	0.7726	0.7854	-0.5704	-0.6044	1.1988	1.0016	-1.2823	-1.2308
1990-1997	-1.3851	-1.3836	0.0551	0.2932	-0.3694	-0.9387	0.5189	1.8883	-0.7400	-3.8217*
1998-2005	0.9583	0.2599	-0.4728	-0.9401	-0.0982	-0.1493	0.7190	1.3331	-1.3023	-2.8845*
2006-2013	0.5136	0.5387	0.0817	0.5716	0.4412	1.3002	-0.5218	-2.1018*	-1.4671	-5.5305*

**gives significance at the 5% level*

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1982-2013	4.6768	1.0978	-0.0371	-0.1000	0.9425	1.0963	0.7808	1.5185	-1.3165	-3.9131*
1982-1997	13.4238	0.8114	0.2724	0.4363	1.8206	0.9022	0.9489	1.0988	-2.3126	-1.3282
1998-2013	2.1133	0.8337	-0.5072	-2.1443*	0.1511	0.5175	0.3919	1.7331	-1.1609	-6.7012*
1982-1989	43.5442	1.4476	-0.3791	-0.3192	4.7600	1.0036	-0.2849	-0.0982	-4.9414	-1.5805
1990-1997	-6.1010	-1.5429	0.1323	0.5157	0.3657	0.9002	0.7968	2.0389	-0.2477	-0.5491
1998-2005	2.4835	0.6063	-1.2316	-2.0831	0.0357	0.1112	0.2637	0.7509	-0.9802	-3.5661*
2006-2013	0.1725	0.1059	-0.1716	-1.2411	0.9799	2.6068*	-0.5293	-1.7084	-1.1898	-26.7527*

**gives significance at the 5% level*

(One-year) volatility strategy

Table 19: Results of the CAPM for the volatility strategy when the holding period is equal to one month. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the volatility strategy.

Period	α	T-value	βmarket	T-value
1981-2013	-2.3018	-2.5058*	-0.1143	-1.0368
1981-1996	-2.5530	-1.4274	-0.0862	-0.4638
1997-2013	-2.0748	-3.0642*	-0.1335	-0.9258
1981-1989	-2.7170	-0.8791	-0.1647	-0.7038
1990-1997	-2.3431	-2.9731*	0.1356	0.6012
1998-2005	-2.6547	-2.4408*	-0.1865	-0.7390
2006-2013	-1.6083	-1.8955	-0.1314	-0.6998

**gives significance at the 5% level*

Table 20: Results of the Fama & French three-factor model for the volatility strategy with a holding period of one month. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the volatility strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1981-2013	-2.0772	-2.3585*	-0.2029	-1.8142	-0.0576	-0.2394	-0.4470	-2.1482*
1981-1996	-2.4238	-1.6226	-0.1351	-0.8008	-0.1477	-0.2227	-0.2145	-0.4490
1997-2013	-1.8806	-2.6213*	-0.2134	-1.3271	-0.0308	-0.1532	-0.5370	-2.5104*
1981-1989	-2.3366	-0.9014	-0.3331	-1.2305	0.8220	0.6640	-0.3096	-0.4218
1990-1997	-2.4377	-4.0803*	0.2174	1.2399	-1.1750	-5.7669*	-0.0751	-0.2635
1998-2005	-2.0471	-1.6402	-0.6102	-1.8960	-0.1368	-0.5409	-0.9438	-2.2658*
2006-2013	-1.6992	-1.9807*	-0.1255	-0.5923	0.3815	1.1053	-0.4115	-1.3390

**gives significance at the 5% level*

Table 21: Results of the CAPM for the volatility strategy when the holding period is equal to three months. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the volatility strategy.

Period	α	T-value	βmarket	T-value
1981-2013	-4.5996	-1.8515	-1.2241	-6.5850*
1981-1996	-5.3932	-1.1613	-1.2897	-3.5463*
1997-2013	-3.7997	-2.1486*	-1.1796	-5.7214*
1981-1989	-5.8995	-0.6901	-1.5563	-3.1734*
1990-1997	-5.0823	-2.7034*	-0.5735	-2.8684*
1998-2005	-5.6976	-2.2130*	-1.2756	-6.0116*
2006-2013	-2.8204	-1.1859	-1.1321	-2.7912*

**gives significance at the 5% level*

Table 22: Results of the Fama & French three-factor model for the volatility strategy with a holding period of three months. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the volatility strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1981-2013	-4.6847	-2.1174*	-1.0142	-3.9425*	-0.8580	-2.8031*	0.0581	0.2304
1981-1996	-5.6056	-1.6640	-1.0380	-1.6493	-1.3454	-2.9845*	-0.2558	-0.3473
1997-2013	-3.7457	-2.4178*	-1.0189	-3.8576*	-0.5673	-1.5596	0.2326	1.1929
1981-1989	-3.5516	-0.6366	-1.7723	-1.8404	-0.6454	-0.7883	-0.9262	-0.7296
1990-1997	-7.6242	-6.6660*	0.2266	1.0048	-2.0010	-7.5284*	0.1505	0.6525
1998-2005	-6.4346	-3.0825*	-0.9294	-2.1294*	-0.2596	-0.5489	0.5738	1.7647
2006-2013	-2.4701	-1.2195	-0.9555	-2.2877*	-0.9734	-1.5745	-0.1032	-0.2680

**gives significance at the 5% level*

Table 23: Results of the CAPM for the volatility strategy when the holding period is equal to six months. The following regression is run: $\alpha + \beta MKT_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the volatility strategy.

Period	α	T-value	βmarket	T-value
1981-2013	-9.2293	-2.1828*	-1.2137	-3.2514*
1981-1996	-9.0846	-1.1651	-1.7949	-2.6883*
1997-2013	-8.8875	-2.9262*	-0.6783	-2.6018*
1981-1989	-11.5412	-0.7242	-1.9817	-2.0811
1990-1997	-7.4876	-1.8586	-0.9497	-1.8589
1998-2005	-12.3910	-2.8974*	-0.9242	-2.2595*
2006-2013	-6.1571	-1.2321	-0.6584	-1.8678

**gives significance at the 5% level*

Table 24: Results of the Fama & French three-factor model for the volatility strategy with a holding period of six months. The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB and HML are the size and value factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the volatility strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value
1981-2013	-8.7029	-2.8952*	-0.9737	-2.3131*	-1.7396	-1.8444	0.0325	0.0566
1981-1996	-8.4472	-0.9756	-1.3530	-1.8368	-2.9825	-1.5308	-0.9369	-0.8169
1997-2013	-9.7483	-2.9067*	-0.5096	-1.5723	-0.4588	-1.3435	0.7073	2.2818*
1981-1989	1.2306	0.0648	-2.3431	-1.7807	-3.2950	-0.9483	-2.7970	-1.1467
1990-1997	-11.5481	-4.5631*	-0.2924	-0.9166	-1.8927	-4.4676*	0.0213	0.0855
1998-2005	-15.7856	-4.2539*	-0.1745	-0.3730	-0.1473	-0.3064	0.9224	3.2474*
2006-2013	-4.3214	-1.2187	-0.6585	-1.3051	-1.3278	-0.9853	0.9728	0.6750

**gives significance at the 5% level*

Table 25, 26 and 27: Results of the Carhart four-factor model for the volatility strategy with a holding period of one, three and six month(s). The following regression is run: $\alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_t$. MKT is the market return from the CRSP index corrected for the risk-free rate from Ibbotson Associates. SMB, HML, and MOM are the size, value and momentum factors respectively retrieved from Kenneth French' website. A significant α indicates abnormal returns of the strategy and thus risk-adjusted excess returns, a significant β means a significant influence of the coefficient on the performance of the volatility strategy.

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1981-2013	-2.1913	-2.4673*	-0.1689	-1.4791	-0.0660	-0.2783	-0.4050	-1.8075	0.1339	0.9837
1981-1996	-2.4887	-1.6668	-0.1366	-0.8006	-0.1397	-0.2107	-0.2024	-0.4273	0.0801	0.4134
1997-2013	-1.9842	-2.6326*	-0.1493	-0.8541	-0.0573	-0.2880	-0.4897	-2.1105*	0.1483	0.8837
1981-1989	-2.3245	-0.9384	-0.3329	-1.2232	0.8228	0.6571	-0.3123	-0.4153	-0.0165	-0.0455
1990-1997	-2.3823	-3.6661*	0.2199	1.2333	-1.1941	-5.4430*	-0.0803	-0.2792	-0.0632	-0.3069
1998-2005	-1.9878	-1.5923	-0.6402	-1.8547	-0.1183	-0.4267	-0.9576	-2.3202*	-0.0568	-0.3403
2006-2013	-1.7275	-2.0723*	-0.0068	-0.0382	0.3699	1.0303	-0.1579	-0.4174	0.4141	1.6776

**gives significance at the 5% level*

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1981-2013	-5.8252	-2.5367*	-0.9272	-3.8323*	-0.7176	-2.0668*	0.2201	0.8736	0.4338	1.4944
1981-1996	-6.5908	-1.6012	-1.0869	-1.5842	-1.1809	-2.1867*	-0.1328	-0.2126	0.4270	0.8308
1997-2013	-4.9639	-2.9150*	-0.8343	-4.3100*	-0.4178	-0.9063	0.4061	1.9554	0.5000	1.2577
1981-1989	-6.1433	-0.9065	-1.9042	-1.7894	-0.2263	-0.2250	-0.4559	-0.4422	1.1160	1.2679
1990-1997	-7.7201	-5.5003*	0.2280	0.9837	-1.9918	-7.0877*	0.1558	0.6980	0.0329	0.1459
1998-2005	-6.4448	-2.5333*	-0.9281	-2.0735*	-0.2588	-0.4970	0.5751	1.4147	0.0023	0.0056
2006-2013	-2.7291	-1.2451	-0.7162	-2.5688*	-0.7686	-1.8586	0.4029	1.1902	1.0533	2.7210*

**gives significance at the 5% level*

Period	α	T-value	βmarket	T-value	βsmb	T-value	βhml	T-value	βmom	T-value
1981-2013	-12.1005	-3.2252*	-0.8979	-2.2024*	-1.5345	-1.7878	0.2270	0.4456	0.7362	2.1658*
1981-1996	-17.1815	-1.3304	-1.6104	-1.8493	-2.1409	-1.5681	-0.2256	-0.3165	1.8183	1.2227
1997-2013	-11.8893	-3.5405*	-0.3568	-1.1120	-0.3402	-0.9226	0.7811	2.3881*	0.5080	1.5482
1981-1989	-20.5960	-0.7258	-2.1174	-1.6996	-2.8504	-0.9713	-0.4068	-0.2130	3.1955	1.0615
1990-1997	-12.8353	-4.6518*	-0.3424	-1.0632	-1.7040	-3.9260*	0.0999	0.3304	0.2727	0.7816
1998-2005	-16.9729	-6.7239*	-0.0871	-0.1712	-0.1288	-0.2601	0.9844	2.4940*	0.1480	0.4093
2006-2013	-6.3549	-1.3676	-0.4168	-1.0748	-0.0669	-0.0744	0.5173	0.8364	0.9744	3.1173*

**gives significance at the 5% level*

Appendix D: Summary statistics fundamental-based explanations

This section provides the results of the analysis regarding the effects of the various fundamentals and dummy variables on the returns of the different strategies for the different holding periods. Please note, information is provided if it reflects uni-or multivariate regressions.

Momentum strategy

Table 28: Results of the univariate regressions with the spread of the momentum strategy as dependent variable and a holding period of six months. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	2.7121	2.0939*	0.0887	0.1342	-0.0315	-0.0236	-1.0869	-0.1454
1981-1996	-0.9590	-0.9435	-0.1835	-0.2274	-7.5324	-2.2488*	-13.5145	-0.9919
1997-2013	4.9748	3.8579*	0.9764	1.6183	1.7324	1.2913	14.9133	3.6599*
1981-1989	-1.6259	-0.7788	0.4300	0.3953	-7.0223	-1.8466	-15.1213	-0.7208
1990-1997	-1.0703	-1.4002	0.2033	0.2853	-3.4937	-2.7800*	-5.2039	-1.3541
1998-2005	8.8814	3.5871*	1.7453	0.8918	7.8165	3.8812*	20.3546	2.5687*
2006-2013	4.2218	2.5652*	0.1690	0.3415	0.1609	0.2150	20.3847	2.6892*

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	5.6296	1.0253	-11.0585	-0.9070	0.5672	0.1229	12.8955	1.6507
1981-1996	-5.5749	-1.3020	13.4068	1.1306	-6.4358	-0.8126	11.8856	1.0853
1997-2013	16.9800	4.3451*	-31.7317	-2.5007*	8.1625	2.5624*	11.6550	1.4997
1981-1989	-2.2638	-0.4030	23.4809	1.1460	-4.1746	-0.5490	22.6204	1.0894
1990-1997	-3.8707	-2.0227	3.8788	1.6596	0.6574	0.3558	0.6673	0.2006
1998-2005	20.2283	3.3294*	-26.6439	-2.6819*	13.8314	2.2260*	7.5438	0.7480
2006-2013	15.9672	2.9236*	-33.6049	-1.5697	6.2170	1.8528		

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	-2.7841	-0.2989	-8.1314	-0.7921	-10.0509	-1.0778
1981-1996	16.3036	1.3096	-17.9563	-1.3637	-15.0587	-1.2048
1997-2013	-17.4318	-1.8740	5.1185	0.7535	-4.3705	-0.5168
1981-1989	11.3964	0.5405	-22.6587	-0.9920		
1990-1997	10.6595	3.6801*	-8.5346	-3.1327*	0.5698	0.1122
1998-2005	-26.2396	-4.3855*	-0.4441	-0.0510	-22.6195	-3.3408*
2006-2013	-13.6103	-1.2638	13.6103	1.2638	7.4876	0.8203

**gives significance at the 5% level*

Table 29: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of six months, controlled for industrial production. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	5.5562	1.4626	-1.4555	-0.8241	-1.2597	-0.4771	-0.6695	-0.1134
1981-1996	2.3484	0.3027	0.2230	0.0652	-5.2110	-0.6293	-13.2052	-0.8782
1997-2013	6.7394	2.9609*	-2.6495	-1.7576	-1.6058	-1.0352	12.2455	1.5989
1981-1989	3.3357	0.2702	0.1639	0.0286	-4.4076	-0.2711	-20.1947	-0.6415
1990-1997	-1.3708	-0.5762	0.6349	0.6262	-2.7236	-1.3759	-8.6435	-2.3929*
1998-2005	8.7739	1.8216	2.1190	0.6560	2.4677	0.6138	21.1592	1.3148
2006-2013	6.0674	2.2990	-4.2731	-2.3242*	-1.6766	-0.9357	21.0614	2.1338

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	14.6129	0.6072	13.3338	0.9866	1.8631	0.1289	-3.2198	-0.2454
1981-1996	35.9485	0.7790	12.7415	0.3799	25.7598	0.9047	-1.4018	-0.0448
1997-2013	16.4593	0.9671	-4.4347	-0.3412	-4.4708	-0.4089	-6.4828	-0.7346
1981-1989	54.2338	0.6219	13.0914	0.1854	36.4532	0.5170		
1990-1997	3.0729	0.2398	6.1739	1.1965	16.4662	3.8414*	-2.4284	-0.4860
1998-2005	56.5870	2.0321	-20.6490	-1.1759	-7.5518	-0.3893	-14.8955	-1.2325
2006-2013	10.9943	0.5865			7.6742	0.5950	-7.4149	-0.4602

**gives significance at the 5% level*

Table 30: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of six months, controlled for employment. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Services		Employment	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-0.7109	-0.4196	-0.2285	-0.0882	-1.2836	-0.2062	6.4050	0.6828
1981-1996	0.2514	0.0735	-5.6913	-0.6232	-13.2211	-0.8785	5.8903	0.2821
1997-2013	-1.0745	-0.6727	-0.8567	-0.4367	12.0319	1.1498	7.9922	1.0412
1981-1989	0.1856	0.0323	-5.1856	-0.3064	-18.3570	-0.5667	10.3731	0.2583
1990-1997	0.5657	0.6699	-2.0296	-1.1821	-9.2693	-2.8060*	-4.5830	-1.3621
1998-2005	4.5317	1.5433	6.8782	1.8170	16.6167	0.9245	22.6456	1.5434
2006-2013	-3.1002	-1.0792	-2.4512	-0.7149	36.3361	2.0325	-1.3405	-0.1314

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-1.4179	-0.0655	11.3806	0.8277	0.4318	0.0294	-7.2174	-0.5552
1981-1996	33.5279	0.7961	10.2246	0.3002	27.2228	0.9285	-3.1140	-0.1006
1997-2013	-2.0085	-0.1131	-9.2128	-0.6137	-8.8541	-0.7154	-11.7396	-1.1964
1981-1989	52.2930	0.6223	9.8231	0.1403	38.0975	0.5361		
1990-1997	1.5096	0.1504	5.7422	1.5394	16.6909	4.3076*	-2.9444	-0.6524
1998-2005	60.0952	1.9748	-27.5617	-1.5013	-25.4860	-1.1537	-12.3377	-0.9802
2006-2013	-5.2388	-0.2225			1.5485	0.0881	-27.6281	-1.2956

**gives significance at the 5% level*

Table 31: Results of the multivariate regression with the spread of the momentum strategy as dependent variable and a holding period of six months, controlled for gdp. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Business-cycle		GDP	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-0.6093	-0.3521	-0.3443	-0.1274	-9.8161	-0.5192	0.3880	0.0632
1981-1996	-0.8419	-0.2737	-5.6978	-0.7050	23.9795	0.6232	-0.4644	-0.0368
1997-2013	-2.1793	-1.3997	-1.0130	-0.5409	-24.8299	-1.6869	6.3419	1.2208
1981-1989	-1.1934	-0.2335	-4.3085	-0.2728	35.1166	0.4827	2.6231	0.1118
1990-1997	0.3488	0.2879	-4.8062	-2.5603*	26.6487	1.6137	2.7423	0.5643
1998-2005	1.2864	0.5451	4.9515	1.1324	22.8437	0.9342	13.9445	1.4485
2006-2013	-6.1486	-1.8798	0.6361	0.2266	-50.1966	-2.3135*	9.6195	1.2773

**gives significance at the 5% level*

Period	Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	12.2389	0.8999	-0.8768	-0.0635	-7.6919	-0.6292
1981-1996	20.6242	0.6361	29.2639	1.0442	-19.5348	-0.7557
1997-2013	0.1662	0.0130	-18.7781	-1.4692	-10.5799	-1.0254
1981-1989	32.9427	0.5038	30.9368	0.4323		
1990-1997	1.0711	0.2175	15.2202	2.5009*	-7.6615	-1.4957
1998-2005	-14.9657	-0.8855	-30.5254	-1.1923	-23.2060	-1.6230
2006-2013			3.1954	0.1445	4.1024	0.1961

**gives significance at the 5% level*

Reversal strategy

Table 32: Results of the univariate regressions with the spread of the reversal strategy as dependent variable and a holding period of one month. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-1.2195	-1.4040	0.0811	0.4961	-0.4840	-0.7798	-0.2702	-0.0773
1982-1997	-0.3050	-0.1474	0.0728	0.3713	1.0233	0.8561	2.2446	0.4979
1998-2013	-2.0917	-2.1337*	0.0575	0.2168	-1.1375	-1.4863	-6.2130	-2.0975*
1982-1989	-0.6661	-0.2042	0.0217	0.0917	1.6013	1.0724	2.0360	0.3908
1990-1997	0.6275	0.6847	0.0835	0.4478	-0.8011	-0.7476	-2.1291	-1.3985
1998-2005	-3.4991	-2.0220*	-0.0551	-0.1776	-1.9718	-1.7272	-7.4156	-1.8508
2006-2013	-1.3844	-1.2454	0.3286	0.5387	-0.3723	-0.3682	-5.4639	-1.1409

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-5.9537	-1.1709	0.4447	0.2198	-0.0337	-0.0185	-1.5405	-0.9616
1982-1997	-8.3585	-0.7060	-4.5261	-2.0172*	10.9412	1.4480	-2.3449	-0.9376
1998-2013	-4.8246	-1.8666	4.1005	1.6923	-1.5648	-1.0768	-0.6872	-0.3749
1982-1989	-19.1836	-0.8317	-8.1762	-2.0705*	2.0989	0.2100	-5.1711	-0.9823
1990-1997	2.6234	1.6362	-0.7429	-0.4701	6.7477	1.6086	0.0646	0.0588
1998-2005	-5.8492	-1.5277	5.2333	2.6543*	-25.8829	-2.1018*	-0.2166	-0.0991
2006-2013	-3.5932	-1.3460	3.4161	1.0381	-0.1987	-0.1149	-0.7576	-0.8217

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1982-2013	-1.2672	-0.8277	2.4081	1.1094	0.9853	0.5731
1982-1997	-4.1320	-1.7202	4.4612	1.3689	1.6495	0.6256
1998-2013	0.9710	0.6888	-0.3304	-0.2428	0.0551	0.0387
1982-1989	-6.7633	-1.6741	7.4572	1.2066		
1990-1997	-1.6221	-1.0831	1.2025	1.1881	-1.7032	-1.4687
1998-2005	1.2866	0.7443	-0.1380	-0.0595	2.1827	0.8766
2006-2013	0.6377	0.4436	-0.6122	-0.4211	-1.6950	-0.9657

**gives significance at the 5% level*

Table 33: Results of the multivariate regressions with the spread of the reversal strategy as dependent variable and a holding period of one month. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-1.1882	-0.6938	0.2057	0.5731	-0.7499	-0.6509	-0.7950	-0.2588
1982-1997	-1.0001	-0.2898	0.2183	0.3589	0.3974	0.1416	0.5910	0.1077
1998-2013	-1.5617	-1.3872	0.2623	0.8500	-1.1791	-1.7240	-6.2244	-2.2430*
1982-1989	-0.7495	-0.1068	0.3329	0.3278	1.2721	0.2570	-0.0911	-0.0089
1990-1997	0.9660	0.8675	0.1228	0.4857	-1.0581	-1.0882	-1.3924	-0.7219
1998-2005	-2.4150	-1.2889	0.3513	0.8068	-2.2114	-2.0342*	-6.9336	-1.7204
2006-2013	-1.4288	-1.0239	0.5782	1.1862	-0.5400	-0.6086	-0.7031	-0.1565

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-7.1238	-1.8251	-2.0407	-0.5504	1.9130	0.4636	-2.4847	-1.0955
1982-1997	-12.0362	-1.5662	-7.1630	-0.9836	9.5410	0.5022	-3.2166	-0.7743
1998-2013	-3.2164	-1.1908	1.8785	0.7184	3.5065	1.4907	-0.3725	-0.2039
1982-1989	-24.0365	-1.5435	-12.7865	-0.8359	2.9386	0.0704	-6.0884	-0.7366
1990-1997	1.4861	0.6591	2.1907	0.8169	8.4229	1.2474	-0.8282	-0.6407
1998-2005	-5.1820	-1.2337	-4.4121	-0.9224	-21.4931	-1.8996	-0.4431	-0.1518
2006-2013	-0.3719	-0.1027	5.6766	1.7786	1.7739	0.6859	3.0907	0.3793

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1982-2013	-3.1356	-1.2673	0.1910	0.0898
1982-1997	-6.4139	-1.3331	1.9308	0.4604
1998-2013	-1.0130	-0.4902	-0.8387	-0.4934
1982-1989	-7.6816	-0.5858		
1990-1997	-1.4732	-1.0758	-0.7816	-0.5746
1998-2005	-0.1677	-0.0362	0.4000	0.1448
2006-2013	-3.4186	-1.2422	-5.7212	-1.8590

**gives significance at the 5% level*

Table 34: Results of the univariate regressions with the spread of the reversal strategy as dependent variable and a holding period of three months. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-1.4187	-1.2291	-0.3652	-0.9985	-1.0270	-1.2315	-1.0058	-0.1781
1982-1997	1.9841	1.5149	-0.4312	-1.0286	-0.8387	-0.3272	5.7982	0.7099
1998-2013	-3.9986	-2.3285*	-0.4376	-0.4119	-1.0589	-1.2629	-11.8651	-2.8036*
1982-1989	3.6864	1.4078	-0.9006	-1.2850	-3.8465	-0.5986	2.8404	0.2920
1990-1997	0.5163	0.6355	1.0237	2.1526*	1.1577	0.5673	-0.5067	-0.1598
1998-2005	-8.3922	-2.7440*	-0.8127	-0.4125	-3.5205	-2.0868*	-14.8900	-1.8459
2006-2013	-2.2234	-1.4386	0.3711	0.5543	0.0673	0.0883	-14.1676	-2.0424

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-0.8660	-0.1407	3.7304	0.5089	-0.8362	-0.2554	-5.6248	-1.1490
1982-1997	13.3060	1.4161	-10.6174	-1.6638	4.2532	1.0384	-8.4051	-1.1202
1998-2013	-13.6558	-2.9782*	15.2730	1.5199	-5.8187	-1.5912	-2.8127	-0.4975
1982-1989	16.0874	1.1888	-19.2874	-1.6401	-1.6477	-0.2833	-15.2132	-0.9925
1990-1997	4.8190	1.5385	-1.9475	-0.8378	4.2841	1.6420	-2.3808	-1.0324
1998-2005	-24.8355	-3.5652*	13.6196	3.2719*	-13.7379	-1.7817	-0.0522	-0.0075
2006-2013	-7.0797	-2.0930*	15.1910	1.1522	-1.6769	-0.7585		

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1982-2013	-0.6497	-0.1304	5.5544	0.8139	2.0163	0.3808
1982-1997	-10.5244	-1.4986	13.2614	1.3742	5.9798	0.7432
1998-2013	6.7863	1.3994	-4.7293	-1.1065	-2.2476	-0.5227
1982-1989	-17.7900	-1.4384	21.1880	1.2154		
1990-1997	-3.3466	-0.9586	4.2955	1.6875	-2.5492	-1.2059
1998-2005	2.4691	0.3867	-1.1619	-0.1595	4.9638	0.8752
2006-2013	8.6095	1.6570	-8.6095	-1.6570	-7.8072	-1.6278

**gives significance at the 5% level*

Table 35: Results of the multivariate regressions with the spread of the reversal strategy as dependent variable and a holding period of three months. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-1.7707	-0.5575	-0.1638	-0.1754	-1.0156	-0.4905	-0.8302	-0.1353
1982-1997	-1.1716	-0.1789	-0.6606	-0.4564	-5.8423	-0.8479	8.9765	0.7425
1998-2013	-4.0849	-1.6731	0.4855	0.4158	0.2273	0.1692	-10.8690	-1.5246
1982-1989	-9.3488	-0.5851	-1.2035	-0.4942	-14.7818	-1.0315	21.9198	0.7895
1990-1997	-0.1349	-0.0542	1.0223	1.2459	-0.1745	-0.0691	-0.0036	-0.0008
1998-2005	-6.9540	-2.0343	-0.6753	-0.4145	-2.4824	-1.0050	-16.7733	-1.6596
2006-2013	-0.1863	-0.0440	0.9929	0.4180	0.8409	0.3729	-11.6014	-0.7991

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	2.4249	0.3093	0.2430	0.0184	1.3737	0.2185	-7.0713	-0.9507
1982-1997	23.1072	1.3130	-2.9552	-0.1249	-4.4543	-0.3780	-14.2694	-1.0600
1998-2013	-8.2441	-1.3487	-8.5672	-0.6958	4.1670	0.7827	3.1554	0.4365
1982-1989	54.7663	1.2946	-27.7060	-0.4849	-5.8840	-0.2247	-29.7957	-1.0407
1990-1997	2.4782	0.4394	0.8299	0.0757	3.6132	0.8069	-2.9835	-0.6926
1998-2005	-21.5620	-2.1673*	-40.1114	-1.9169	-3.0353	-0.3367	4.6664	0.4534
2006-2013	3.5843	0.4031	22.4177	1.4293	5.3339	0.6596		

**gives significance at the 5% level*

Period	Dumpess		Dumpres	
	β	T-value	β	T-value
1982-2013	-4.4007	-0.5491	-0.7046	-0.0962
1982-1997	-13.8438	-0.9066	4.6180	0.3099
1998-2013	0.7496	0.0922	-1.9306	-0.2970
1982-1989	-16.9684	-0.3784		
1990-1997	-6.6161	-1.3512	1.7852	0.3396
1998-2005	11.1975	0.7773	-7.0477	-0.7903
2006-2013	2.6347	0.1646	-2.7746	-0.1530

**gives significance at the 5% level*

Table 36: Results of the univariate regressions with the spread of the reversal strategy as dependent variable and a holding period of six months. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-1.7185	-1.2450	0.0465	0.0581	-0.4377	-0.3229	1.7656	0.2056
1982-1997	2.4218	1.4022	0.1396	0.1234	7.6631	1.5571	12.2041	0.7240
1998-2013	-4.6396	-3.7367*	-0.6760	-0.9111	-2.1875	-1.6921	-12.1817	-3.9810*
1982-1989	3.7417	1.1278	-1.1689	-0.6289	9.1759	1.6682	10.8288	0.4205
1990-1997	1.4573	1.1798	1.0394	1.0943	-0.9707	-0.2762	5.0982	2.2732*
1998-2005	-9.4308	-5.7607*	-1.5326	-0.5897	-8.6819	-11.0411*	-14.6721	-2.8814*
2006-2013	-3.3032	-2.8353*	-0.1008	-0.2247	-0.6408	-0.8777	-19.2280	-4.2072*

**gives significance at the 5% level*

Period	Employment		Business-cycle		GDP		Dumopt	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-2.5441	-0.4536	3.8738	0.2759	0.4757	0.0882	-7.4179	-0.8234
1982-1997	10.5295	2.3235*	-32.9491	-2.4826*	10.1194	0.9271	-10.7950	-0.7729
1998-2013	-15.0878	-5.9286*	29.2120	3.2704*	-7.7942	-2.6413*	-3.3042	-0.3788
1982-1989	9.3096	0.8872	-50.1220	-2.0700	8.1336	0.6309	-23.5596	-0.8272
1990-1997	4.0597	1.2738	-13.4636	-7.2224*	2.6431	0.7504	0.3643	0.0976
1998-2005	-20.7067	-4.9133*	31.4695	4.7612*	-20.2490	-4.5034*	2.4772	0.2257
2006-2013	-13.5602	-3.2567*	26.7585	1.6511	-5.2763	-1.9854		

**gives significance at the 5% level*

Period	Dumpess		Dummild		Dumpres	
	β	T-value	β	T-value	β	T-value
1982-2013	0.7286	0.0738	5.4730	0.4443	5.4075	0.5125
1982-1997	-18.9547	-1.4086	18.5334	1.1185	13.5016	0.8281
1998-2013	15.0068	1.6973	-12.2878	-1.8945	-3.6209	-0.4518
1982-1989	-22.8783	-0.9985	26.8006	0.9126		
1990-1997	-8.7502	-1.7553	6.4413	1.4147	-3.9281	-1.3055
1998-2005	12.2078	1.8254	-6.6534	-0.6180	9.0046	1.0535
2006-2013	18.7742	2.0366	-18.7742	-2.0366	-13.5906	-2.0101

**gives significance at the 5% level*

Table 37: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of six months, controlled for industrial production. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-4.5567	-1.0440	0.9159	0.4493	0.1380	0.0451	2.8005	0.4004
1982-1997	-1.0875	-0.1228	-0.4230	-0.1114	3.8145	0.3820	12.7316	0.7602
1998-2013	-7.2634	-3.4137*	2.8642	2.0711*	0.4273	0.2954	-4.1606	-0.5851
1982-1989	-2.6521	-0.1569	0.4695	0.0616	3.0894	0.1465	21.0702	0.5201
1990-1997	0.3451	0.0578	1.9097	0.7507	-2.5403	-0.5115	8.7813	0.9689
1998-2005	-9.1541	-2.2100	-1.0512	-0.3784	-4.8573	-1.4049	-6.2052	-0.4484
2006-2013	-4.0404	-1.6212	3.3885	1.9517	0.3250	0.1921	-16.2747	-1.7461

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-17.1450	-0.6009	-8.8647	-0.5751	-1.4844	-0.0859	-1.4093	-0.0944
1982-1997	-52.6664	-0.9465	-12.0824	-0.3578	-27.1819	-0.7688	2.7933	0.0830
1998-2013	-8.4682	-0.5396	-0.3417	-0.0287	4.9438	0.5028	-3.6834	-0.4586
1982-1989	-92.2393	-0.6932	-21.2437	-0.2359	-51.0766	-0.4069		
1990-1997	7.2234	0.2247	-8.3858	-0.6477	-18.1104	-1.6839	-0.0144	-0.0012
1998-2005	-33.9327	-1.4170	7.9961	0.5295	-2.8652	-0.1718	0.1839	0.0177
2006-2013	-2.1749	-0.1229			-6.4692	-0.5312	-3.6657	-0.2409

**gives significance at the 5% level*

Table 38: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of six months, controlled for employment. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Services		Employment	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	0.3139	0.1608	-0.7570	-0.2548	3.1076	0.4247	-4.7531	-0.4492
1982-1997	-0.4852	-0.1256	3.6445	0.3393	12.6275	0.7497	-1.3650	-0.0576
1998-2013	1.7679	1.1445	-1.3771	-0.7293	1.0516	0.1014	-12.6338	-1.7433
1982-1989	0.1345	0.0180	2.7715	0.1242	20.4911	0.4883	-1.8800	-0.0353
1990-1997	1.7185	0.7648	-4.3920	-0.9612	10.1914	1.1592	6.4463	0.7199
1998-2005	-3.3811	-1.6043	-9.7712	-3.5962*	2.0611	0.1598	-30.7251	-2.9175*
2006-2013	3.2554	1.3503	-0.1237	-0.0430	-20.9104	-1.3937	-2.9685	-0.3466

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	-2.8360	-0.1124	-7.6004	-0.4873	-0.9890	-0.0565	1.6250	0.1102
1982-1997	-49.9375	-0.9715	-12.2058	-0.3542	-27.9214	-0.7823	4.1605	0.1302
1998-2013	11.7013	0.7167	0.5636	0.0394	8.1818	0.7197	-1.7603	-0.1898
1982-1989	-80.6480	-0.6841	-19.6543	-0.2177	-54.7149	-0.4419		
1990-1997	14.9360	0.5592	-10.0149	-1.0089	-18.0979	-1.7551	1.4507	0.1208
1998-2005	-43.6205	-1.9970	16.0993	1.2217	20.1699	1.2721	-2.4781	-0.2743
2006-2013	11.7091	0.5924			-4.8444	-0.3284	5.4148	0.3026

**gives significance at the 5% level*

Table 39: Results of the multivariate regression with the spread of the reversal strategy as dependent variable and a holding period of six months, controlled for gdp. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Business-cycle		GDP	
	β	T-value	β	T-value	β	T-value	β	T-value
1982-2013	0.3010	0.1534	-0.8062	-0.2602	3.9418	0.1806	1.2437	0.1778
1982-1997	0.4554	0.1352	3.6114	0.3870	-42.1310	-0.9306	4.1691	0.2974
1998-2013	2.1379	1.5316	0.3548	0.2082	20.9341	1.6299	-7.4344	-1.5598
1982-1989	1.2718	0.1956	2.2822	0.1125	-60.9854	-0.6379	5.5320	0.1582
1990-1997	2.7935	1.1617	-2.0795	-0.5582	8.1476	0.2486	5.4454	0.5646
1998-2005	-1.8867	-1.4986	-5.0850	-2.1798	-23.5128	-1.8023	-21.1743	-4.1229*
2006-2013	4.7678	1.8334	-1.4227	-0.6374	41.8576	2.4264*	-6.6840	-1.1163

**gives significance at the 5% level*

Period	Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value
1982-2013	-8.6958	-0.5655	-1.6042	-0.0986	2.9281	0.2105
1982-1997	-17.2580	-0.5322	-32.5630	-0.9506	15.6530	0.5786
1998-2013	5.3049	0.4767	14.2661	1.2467	2.4047	0.2544
1982-1989	-35.6846	-0.4403	-62.4494	-0.4651		
1990-1997	-7.1597	-0.7324	-21.8026	-1.8051	9.3096	0.9157
1998-2005	18.4299	2.0440	29.5255	2.1617	9.4520	1.2391
2006-2013			-3.4164	-0.1943	-13.2940	-0.7994

**gives significance at the 5% level*

Volatility strategy

Table 40: Results of the multivariate regression with the spread of the volatility strategy as dependent variable and a holding period of six months, controlled for industrial production. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Industrial Production		Durables		Nondurables		Services	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	5.3830	1.2733	-0.8603	-0.4377	-3.6843	-1.2539	-4.6248	-0.7042
1981-1996	5.6666	0.6267	-0.0683	-0.0171	-1.8385	-0.1905	-15.2798	-0.8719
1997-2013	2.3909	1.0095	-0.3552	-0.2265	-5.4552	-3.3795*	3.6706	0.4606
1981-1989	6.8626	0.4833	0.2542	0.0385	-2.4790	-0.1326	-30.1334	-0.8322
1990-1997	0.3403	0.0663	-0.7291	-0.3330	1.0249	0.2398	0.3262	0.0418
1998-2005	0.3684	0.0664	-0.9234	-0.2482	-7.8794	-1.7018	-3.1528	-0.1701
2006-2013	-2.5703	-1.0054	-2.9201	-1.6397	-4.3165	-2.4870*	33.4801	3.5018*

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	30.5375	1.1402	8.7758	0.5835	2.7470	0.1708	9.6668	0.6620
1981-1996	75.9884	1.4130	24.8717	0.6363	17.7862	0.5360	11.2298	0.3082
1997-2013	-4.3477	-0.2455	-6.9378	-0.5130	-3.3303	-0.2927	5.9012	0.6426
1981-1989	96.2574	0.9597	14.3802	0.1771	35.5919	0.4388		
1990-1997	48.6134	1.7571	14.9481	1.3417	12.2407	1.3225	-7.3494	-0.6813
1998-2005	-32.3074	-1.0074	8.5491	0.4227	-36.3652	-1.6279	15.6862	1.1270
2006-2013	-14.3261	-0.7889			10.7713	0.8622	-21.0750	-1.3502

**gives significance at the 5% level*

Table 41: Results of the multivariate regression with the spread of the volatility strategy as dependent variable and a holding period of six months, controlled for employment. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Services		Employment	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	-0.1901	-0.1014	-2.6692	-0.9307	-5.5903	-0.8117	8.1914	0.7892
1981-1996	0.4664	0.1163	-1.3181	-0.1231	-15.9617	-0.9042	6.9425	0.2835
1997-2013	0.4069	0.2730	-5.5246	-3.0182*	6.0484	0.6195	-0.1620	-0.0226
1981-1989	1.2578	0.1883	-1.8583	-0.0944	-29.6777	-0.7879	3.7920	0.0812
1990-1997	-0.8343	-0.4249	-0.1311	-0.0328	1.2162	0.1583	4.2419	0.5422
1998-2005	-0.1627	-0.0610	-8.7938	-2.5600*	9.0715	0.5562	-24.0358	-1.8053
2006-2013	-4.0434	-1.7940	-3.0559	-1.1359	21.6577	1.5441	4.3006	0.5372

**gives significance at the 5% level*

Period	Business-cycle		Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	17.7957	0.7432	6.6127	0.4347	1.8017	0.1110	5.8361	0.4057
1981-1996	61.3686	1.2424	21.0141	0.5260	18.8019	0.5467	7.5081	0.2068
1997-2013	-12.4449	-0.7511	-10.3682	-0.7403	-4.6306	-0.4010	3.4162	0.3731
1981-1989	68.3655	0.6996	8.8046	0.1081	35.0552	0.4242		
1990-1997	53.2944	2.2834*	14.0360	1.6182	12.2254	1.3568	-6.4381	-0.6135
1998-2005	-53.3775	-1.9330	11.3950	0.6840	-21.8983	-1.0925	15.8171	1.3848
2006-2013	-10.4214	-0.5640			15.7391	1.1412	-8.2781	-0.4948

**gives significance at the 5% level*

Table 42: Results of the multivariate regression with the spread of the volatility strategy as dependent variable and a holding period of six months, controlled for gdp. Please note, only the coefficients and their t-statistics are given. The following regression is run: $\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots . \beta_9 X_9 + \varepsilon_t$.

Period	Durables		Nondurables		Business-cycle		GDP	
	β	T-value	β	T-value	β	T-value	β	T-value
1981-2013	0.4118	0.2157	-2.0746	-0.6957	-0.5821	-0.0279	-6.3875	-0.9431
1981-1996	-0.1591	-0.0442	-0.0701	-0.0074	41.4541	0.9210	-6.3627	-0.4308
1997-2013	0.3671	0.2758	-4.2251	-2.6384*	-28.7841	-2.2869*	-4.4256	-0.9963
1981-1989	-0.1426	-0.0238	-1.3432	-0.0727	37.2627	0.4379	-8.8476	-0.3223
1990-1997	-0.7816	-0.3956	1.4146	0.4621	43.6887	1.6223	-1.3033	-0.1645
1998-2005	-0.0429	-0.0222	-5.5003	-1.5347	-41.8511	-2.0880	-12.2099	-1.5474
2006-2013	-5.3496	-1.9689	-1.7747	-0.7610	-44.4342	-2.4654*	6.1312	0.9801

**gives significance at the 5% level*

Period	Dumopt		Dumpess		Dumpres	
	β	T-value	β	T-value	β	T-value
1981-2013	8.8474	0.5897	2.1588	0.1418	5.8294	0.4322
1981-1996	31.1647	0.8218	21.3523	0.6514	-8.8856	-0.2939
1997-2013	1.2231	0.1118	-5.2130	-0.4770	8.6602	0.9816
1981-1989	30.2204	0.3951	37.9239	0.4531		
1990-1997	15.8967	1.9792	12.9832	1.3082	-7.8381	-0.9384
1998-2005	15.3672	1.1093	-20.4380	-0.9740	21.9448	1.8725
2006-2013			13.0738	0.7118	11.1935	0.6442

**gives significance at the 5% level*