Momentum Trading in Financial Markets

An Empirical Investigation of the Effect of Investor Sentiment, Corporate Governance and 52-Week High on Momentum Returns

Thesis submitted for the degree of Doctor of Philosophy

by

Abdulrahman A. Alquraishi

Brunel Business School, Brunel University London

Declaration

I hereby declare that this thesis is based on my original work, except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Brunel University or other institutions.

Name: Abdulrahman A. Alquraishi

Date: June, 2021

Signature:

Abstract

This thesis investigates the existence of momentum returns in recent years and the effect of different explanatory variables on momentum returns in the pursuit of finding the source of momentum. It first tackles the existence of momentum in recent years by showing that momentum returns are large and significant in the last decade, contrary to what recent work have claimed that momentum has disappeared since the 1990s. The thesis also studies for the first time the effect of corporate governance of firms – measured using the G-index – on momentum returns. Results show that investors are more (less) reluctant to buy (sell) winners (losers) stocks that have dictatorship corporate governance structure when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas). Such results indicate that corporate governance influences the decision making of investors when buying and selling stocks.

The thesis also studies the effect of multiple variables that, whilst having an established relationship with momentum returns individually, have yet to be tested as variables simultaneously. The disposition effect, anchoring effect and cognitive dissonance are simultaneously tested on momentum returns, to examine whether they affect momentum returns to the same degree. Results show that investors who primarily focus on a stocks' position relative to its 52-week high will make a positive momentum return due to winners in pessimistic periods and due to losers in optimistic periods. The findings are novel and show that anchoring reinforces the disposition effect, while investor sentiment has the ability to override anchoring and to either weaken or strengthen the disposition effect. This study gives a better understanding of momentum returns, anchoring and the role of investor sentiment in terms of predicting future return continuations or reversals.

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Acknowledgement

First and foremost, I would like to thank Allah almighty for guiding me through this journey, for giving me the patience and determination to complete my studies.

To my late father Abdulaziz, having you in my life gave me strength, without your support I could not have done it. Your continues believe in me early on gave the confidence I needed to reach my goal. For showing me that everything is possible, and that you will be with me every step of the way. For being there for me, every time I needed your support. You will forever be in my heart and prayers, may Allah grant you peace.

To my dear wife Noura and my son Aziz for their unconditional support and encouragement and their incredible understanding that helped me through my studies. For giving me the motivation during the ups and downs of my thesis and for keeping me focused on my goal. For giving me joy and calmness throughout the journey. For making me believe in myself. I wouldn't have done it without you.

To my mother and siblings, for their continuous support throughout the ups and downs, for their incredible understanding and for providing the needs for me to succeed, I will forever be grateful.

To my supervisor Dr. Theodosopoulos for giving me his continues support and guidance through my studies. To my supervisor Dr. Kartsaklas, for his constant support during the long days of researching, teaching and his guidance through my studies. For helping me to grow as a scholar, for showing me the way, for his incredible work ethics and being reachable during a pandemic if I needed any help. The completion of this thesis could not have been possible without your support and guidance. I will always be grateful.

To Dr. Nandy, for taking a chance on me and allowing me to start my studies at Brunel. To all the PGR staff and the whole of BBS for their support.

To Mr. Paul Van Loon, for his support during my masters and throughout my PhD. For showing me the way and for his mentorship.

Last but not least, to Mr. Burhan Kawosa, for all his time and efforts that helped me during my masters. For making me fall in love with finance in the first place.

Chapter One: Introduction

The conventional finance theory has had a significant impact on scholars and investors over the years. Conventional finance theory assumes that the stock market is efficient, meaning that stock prices reflect all available information and that investor acts rationally when buying and selling stocks. More importantly, the conventional finance theory, or the efficient market hypothesis, argues that investors are not able to make profit from stock picking and that the only way to make profit from the market is to buy the market index.

The efficient market hypothesis (EMH hereafter) claims that in the weak form of market efficiency, investors cannot make money from public information. Thus, any trading strategy that makes money from public information is considered an anomaly of EMH. Over the years, scholars have started to find anomalies of the efficient market hypothesis such as contrarian strategy (De Bondt and Thaler, 1985), size (Banz, 1981) and momentum (Jegadeesh and Titman, 1993). The EMH argues that these anomalies are based on excessive risk taking, meaning that the stocks that these trading strategies pick are riskier than the market. To measure such risk, Fama and French introduced the three-factor model, which is an extended version of the Capital Asset Pricing Model (CAPM). In the three-factor model, Fama and French (1993) introduce value factor (HML) as a measure of the risk of value stocks and size factor (SMB) of small sized stocks. If the three-factor model shows that these anomalies load on these risk factors then the argument of the EMH holds: these stocks are riskier than the market and thus they will generate greater returns than the market as compensation for their riskiness. Indeed, when the contrarian strategy and size anomaly were tested against the three-factor model, it showed that they load on the risk factors. However, momentum strategy returns did not load on the risk factors and produces positive significant alphas, which means that the stocks picked in this strategy are not riskier than the market and the abnormal returns it generates is not a compensation for risk. Momentum is a trading strategy that buys and sells stocks based on their performance in the last period, usually in the past 3, 6, 9 and 12 months and holds them for 3, 6, 9 and 12 months. Stocks that have been winning (losing) in the past, will continue to win (lose) in the near future, momentum returns are the difference between the returns of winning stocks and losing stocks.

Since the three-factor model could not explain momentum returns, momentum strategy started to gain significant attention from both scholars and market participants. At first, scholars argued that this only appears in the US market and during specific periods (the period tested by Jegadeesh and Titman, 1993). However, many studies have concluded that the findings of Jagadeesh and Titman not only present during different time periods (Jegadeesh and Titman, 1995, Chan, Jegadeesh and Lakonishok, 1996) but also in different countries (Rouwenhorst, 1998; Lui, Strong and Xu, 1999; Schiereck, De Bondt and Weber, 1999; Griffin, Ji and Martin, 2003; Fama and French, 2012) and in different markets like bond and commodity markets (Shen, Szakmary and Sharma, 2007). Since the out of sample results were established, scholars turned their attention to the source of momentum profits. They ask why such a simple strategy based on widely accessible information generates abnormal returns. Even though many scholars have attempted to identify the source of momentum profits, the answer to that question is still unknown. Answering this puzzle have caught the interest of academics and market participants alike. For academics, it challenged the legitimacy of the EMH, which is enough reason to research it to determine whether it truly violates the EMH or is only a periodic phenomenon that loads on risk factors. For market participants on the other hand, it resembles the holy grail of trading strategies, being based on accessible information (past returns) and generating abnormal returns (positive significant alpha). Finding the true driver of momentum returns could be used by market participants to maximise these returns.

Before beginning the study on momentum returns and their source, it is worth noting that important recent papers have found that momentum has disappeared since the 1990s[1]. Such findings are important to scholars in the field given that studies on momentum returns will not contribute to the literature if momentum is not present at all. Thus, the second chapter of this thesis will focus on the existence of momentum returns in the last decade and whether it was a periodic or continuous phenomena. It will study momentum returns during the period in question (January 1990 to December 2018) and conclude whether, indeed, momentum has disappeared since the 1990s, in which case there is no reason for its further study. Moreover, it would settle the argument between the two schools of thought about whether momentum is driven by behavioural factors or by risk factors. The empirical investigation shows that momentum returns are large and significant during the last decade. It is true that momentum disappeared between 1990 and 2010 but it has since reemerged in the market. Thus, the

[1] Hwang and Rubesam (2015); Bhattacharya, Li and Sonaer, (2017).

argument that momentum returns disappeared simply because investors and most importantly funds acted upon it or the market became more efficient, are inaccurate. Therefore, since momentum is still present, scholars may continue their work investigating the source of momentum returns. Many studies on the source of momentum returns have tackled the subject by studying the effect of one specific variable at a given time. Only a handful of studies have tackled it by studying a set of variables at the same time, i.e. company-specific characteristics. Past returns upon which momentum strategy is based on, is the outcome of specific variables that makes these companies continue in the same direction for the next period. These variables most likely affect momentum returns to different degrees. The literature has already established many different variables that affect momentum; thus, it is only logical to test a set of variables simultaneously rather than one at a time. Doing so will help scholars understand which variable has a more significant effect in explaining momentum returns, which in turn would help to answer the ultimate question of the source of momentum returns.

The third chapter will analyse the effect of corporate governance structures on momentum returns. Corporate governance measured by the G-index in this thesis, which is composed of 24 different variables. The governance index proposed by Gompers, Ishi and Metrick (2003) is a proxy for the balance of powers between shareholders and managers. Each variables have an equal weight in the G index construction, the maximum score is 24 and the minimum score is zero. The higher the G index the lower the shareholders rights. Companies with G index of 14 and above are considered to have a dictatorship shareholders rights, where all the powers are in the hands of the management over shareholders. On the other hand, companies with G index of 5 and below are considered to have a democracy shareholders rights, where all the powers are in the hands of the shareholders over management. The data used to construct the G index are collected form the Investor Responsibility Research Center (IRRC). The 24 variables are listed here: for the "Delay" provision: blank check, classified board, special meeting, written consent. For the "Protection" provision: compinastion plans, contrscts, golden parachutes, indemnification, liability, severance. For the "Voting" provision: bylaws, charter, cumulative voting, secret ballot, supermajority, unequal voting. For the "State" provision: antigreenmail law, business combination law, cash-out law, directors duties law, fair price law, control share acquisition law. For "Other" provision: Antigreenmail, directors' duties, fair price, pension parachutes, poison pill, silver parachutes. The full explanation of all variables are included in the appendix. The relationship between firms' corporate governance levels and their future returns, stock price efficiency and overall market efficiency has already been

established[2]. The objective of this chapter is to first establish the relationship between momentum returns and corporate governance, which will pave the way for future research on other variables or the combining of established variables together to test them simultaneously. The chapter will also establish that such a methodology of testing the effect of variables as a set rather than individually demonstrates an effect on momentum. Results show that corporate governance structure has an impact on the decisions made by investors when buying and selling stocks. Results show that investors are more (less) reluctant to buy (sell) winner (loser) stocks that have dictatorship corporate governance structure when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas). Such results indicate that corporate governance influences the decision making of investors when buying and selling stocks.

Momentum is an important subject, since it not only violates the weak form of the EMH but also generates abnormal returns that are not associated with additional risk. The literature on momentum strategy has therefore been divided into arguments on what drives momentum returns. One school of thought believe that momentum return is based on additional risk taking, meaning that momentum return is simply a compensation for bearing additional risk that is not captured by risk models like the three-factor model of Fama and French. The second school of thought is that momentum returns are driven by behavioural biases from investors, in particular when dealing with new information, which is not considered in the conventional financial theory when explaining the cross section of returns. Both schools of thought have been the product of significant work over the years, which will be discussed fully in the coming chapters. Yet typically, scholars use only one variable to study its effect on momentum returns. For example, Avramov et al. (2007) test whether firms' credit rating directly affects momentum returns. They find that firms with low credit ratings experience greater momentum returns than firms with high credit ratings. They argue that credit rating represents the risk level that the firm is willing to take in order to make money. Thus, when high credit rating companies do well or badly, the stock price reaches its equilibrium price fairly quickly, since the company is not taking great risk with its operations and thus the news about the firm's operations are usually already incorporated into the stock price. With low credit rating companies on the other

[2] The G-index contains 24 provisions that either restrict shareholder rights or increase managerial power and, thus, measure the level of corporate governance in a company. Some provisions include anti-greenmail, blank check, golden parachutes, poison pills, confidential voting, and supermajority. For a full list of provisions see the appendix of Gompers, Ishi and Metrick (2003).

hand, the firm has already taken risk as measured by its credit rating, and thus when it does well – which is unexpected – it continues to do well in the future as more investors are willing to invest aiming for the higher payouts. When it does poorly, it continues to do poorly as more investors short the stock due to its high credit risk along with bad performance. Such arguments are solid and one could conclude the search for the source of momentum returns if credit rating was the only variable that affects momentum returns. However, credit rating is not the only variable that affects momentum returns, as other scholars have shown over the years that there are many different variables that show a relation to momentum returns just as credit rating does. This means that even though credit rating has a significant effect on momentum returns, this effect is not the only one. Hong and Stein (1999), for example, argue that momentum returns are driven by the underreaction of investors and market participants to news. They show that when news reaches investors quickly, investors react to the news in a timely manner and thus the stock price reaches its equilibrium price in a timely manner. When news reaches investors gradually, they react to the news in waves and thus the stock price takes longer to reflect the information. The work of Avramov et al. (2007) and Hong and Stein (1999) are examples of how the literature is divided. The recent literature on the subject does not present decisive evidence that tip the scales in favor of one argument or the other. Scholars have to find new ways to research the subject which test multiple variables at the same time, as both schools have shown that momentum is driven by more than one variable, most likely a collective set of variables that measures a set of characteristics of companies. Indeed the work of Sagi and Seasholes (2007) have touched on this approach when they used a set of variables to determine momentum source. They show that momentum generates more significant returns when sorted by these variables, yet these variables are not linked to each other.[3] This means that they are not linked together to represent a specific characteristic about a company, i.e. growth or value firms.

This study was motivated by several factors. First, the work of Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017), who find that momentum returns has disappeared since the 1990s. Such findings should motivate any scholar who is merely interested in momentum literature because if indeed momentum returns have disappeared due to increased market efficiency and increased investors employing the strategy, then the great efforts to find the source of momentum returns have surely come to an end. This motivates the second chapter

[3] Variables include revenue, cost, and growth options.

of the thesis in examining the recent existence of momentum returns in the US market. The second chapter contributes to the existing literature by showing that momentum returns still exist in the market and have not been diminished as reported in the literature. Moreover, momentum returns exist in pessimistic periods as well as optimistic periods; however, they are less significant. Without such findings, researching the source of momentum loses its importance as it does not exist anymore. Another factor that motivates this study is the failure of the literature to find a single variable that can be labeled as the source of momentum. Despite many years of research on the source of momentum, mainly focusing on behavioral and risk factors, a singular source of momentum is yet to be found. It is indeed true that many scholars have established with robustness that momentum returns are affected by many different variables, for example credit rating, information diffusion, anchoring, disposition effect and cognitive dissonance, but how these factors affect momentum collectively and at which degree is unknown.

It is therefore time to start researching the source of momentum in different way that includes multiple variable being tested simultaneously. The third chapter's objective is to test how firms' level of corporate governance affects momentum returns and whether a multi-variable index model could be useful in determining the source of momentum returns. The G-index first utilized by Gompers, Ishii and Metrick (2003) provided a new avenue for research by establishing a measure of shareholder rights that has an established relationship with future returns and market efficiency which may be tested to see whether it affects momentum returns. The third chapter contributes to the literature by showing the novel relationship between momentum returns and firms' level of corporate governance. Empirical findings show that investors are more (less) reluctant to buy (sell) winners (losers) stocks with weak dictatorship shareholders rights when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas). Companies with weak shareholders rights or corporate governance structure might be of less interest to financial analysts, and so a smaller number of them may follow these stocks on a regular basis. As a result, news about these companies takes longer to disseminate and to be incorporated into current prices, pushing G14 stocks away from fundamental prices for longer periods.

As stated previously, many studies have established with robustness that momentum is affected by many different variables[4]. As an investor and trader myself, reviewing the momentum literature to find the source of momentum profits posed a problem. Not only have many studies have shown, and continue to show, that momentum is driven by different factors but there is also no clear answer that shows whether one variable overrides the effect of the other variables. If this is the case, then the question for future research becomes not which variables drives momentum but rather which variable has the most effect in determining momentum returns. This motivates the fourth chapter in this thesis, which looks at established variables in the literature and tests them simultaneously to see whether one variable overrides the effect of the others in determining momentum returns.

This chapter studies the effect of the disposition, anchoring and cognitive dissonance simultaneously, aiming to see whether any of the above variables override the effect of the others. This will help, if established, to further study the variable with the most effect rather than other factor that could have a minor effect on momentum returns. This chapter shows that 52-week high and momentum are separate phenomena based on how investors react to information about 52-week high and past returns depending on their current sentiment. It contributes to the overall momentum literature by showing that variables that affect momentum returns have a hierarchy of importance amongst them. This chapter shows that cognitive dissonance, which is when investors are reluctant to react to new information when the information is not in sync with the market sentiment, has a greater effect on momentum returns when tested with disposition effect and anchoring effect. These findings pave the way for future research by showing that different variables have different impacts in affecting momentum returns. It is crucial to move on from looking at individual variables and look instead for a set of variables at the same time to assess superiority and eventually find the most significant variable that has the most effect on momentum returns. This study investigates three main areas of research. As stated previously, in chapter two, the study tests whether momentum still exists after three decades since the first paper on the subject was published. The continuation of momentum's existence is crucial to this study, because if momentum has disappeared then there is no point of researching it source as it proves that it is a periodic phenomenon. The study also tests whether a set of variables that are representative of the company's nature when it conducts its business affect momentum returns. This study in chapter three tests firms' level

[4] Information diffusion (Hong and Stein, 1999; Hong and Stein and Lim, 2001), credit rating (Avramov et al., 2006)

of corporate governance and its impact on momentum returns. Finally, in the fourth chapter, this study tests three different variables that have been already researched and has an established relationship with momentum returns, and test them together and at the same time to determine whether investor sentiment (cognitive dissonance) and 52-week high (anchoring) along with the disposition effect could explain momentum returns by showing which one of these variables has superiority over the others of its effect on momentum returns.

The second chapter discusses the history of the momentum strategy and the main variables that are believed to be affecting it and whether momentum returns still exists. It also discusses how investor sentiment affects momentum returns. The main focus of this chapter is the remarks made by Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017), in which they argue that momentum returns have disappeared since the 1990s. This argument is significant because if momentum has disappeared then there is no point for any scholar to research the source of momentum returns and may be accept it as temporary phenomena that disappeared when investors acted upon it. In the second chapter, results show that momentum is present during the tested period of the study (1990–2018). Indeed, during the period, momentum returns are explained by risk-based models, namely the Fama and French three- and five-factor models (1993, 2016) but momentum returns are positive during this period. Moreover, during subperiod from 2010 to 2018, momentum returns show significant positive alphas. This indicates that momentum returns are not explained by risk factors during these times. On the other hand, investor sentiment analysis shows that momentum returns are present in both high- and low-sentiment periods. However, momentum returns are significantly higher in high-sentiment periods when compared to low-sentiment periods. During high-sentiment periods, momentum returns exhibits higher returns in the next intermediate period. The model used in this paper regresses momentum returns on the three-factor model of Fama and French (1993) to establish whether returns load on risk factors. Fama–Macbeth regression is also conducted on momentum returns and investor sentiment to measure whether the changes in variables affect momentum returns. This chapter contributes to the literature by providing more recent findings regarding the effect of investor sentiment on momentum returns and showing that momentum still exists.

The third chapter discusses how a firm's level of corporate governance, measured by the G-index (Gompers, Ishii and Metrick, 2003) can explain momentum returns. Corporate governance is analyzed because it has a positive relationship with information asymmetry and

analyst coverage, which both have a negative relation with momentum returns. Corporate governance also adds a new dimension to the analysis since it is a collective set of variables and not one. This is novel empirical research and the first study that looks at the effect of corporate governance on momentum trading. Corporate governance is associated not only with the way a company handles its employees but also with how it handles and discloses information. The latter has been established as a crucial factor in determining momentum returns (Hong and Stein, 1999; Hong, Lim and Stein, 2000). The model used in this chapter implements a double sorting strategy, where momentum strategy is implemented for each of the 14 different levels (scores of G-index) of corporate governance. Momentum returns in each of the 14 levels are then regressed on the three- and five-factor models of Fama and French (1993, 2016). Results show that momentum is larger among companies with a strong corporate governance structure and lower among companies with a weak corporate governance structure. However, both are explained by risk factors in the Fama and French models. Moreover, implementing the momentum trading strategy on portfolios of stocks with a different corporate governance (G-index) score shows that past winner and loser stocks with weak shareholder rights (G14) exhibit significant positive excess returns during an expansionary and recessionary period respectively. The analysis of risk factors shows that investors buying up G14 winners during good times will even look at stocks with low profitability (apart from being small and highly correlated with the market index). When they sell G14 losers in bad times, they particularly choose stocks of low profitability, low investment, and high exposure with the market portfolio. Overall, investors are less (more) reluctant to sell (buy) losing (extreme winning) stocks of weak shareholders rights (G14) compared to stocks of strong shareholders rights (G5). Finally, results show that corporate governance (or the shareholder rights), as measured by the G-index, significantly affects investor decisions to buy or sell past winners and losers, partly due to being inherently riskier (in terms of investment recovery) and partly due the lower information disclosure, lower analyst coverage and slower information diffusion that characterises stocks with the weakest shareholder rights.

The fourth chapter discusses the effect of 52-week high on momentum returns, controlling for investors sentiment. It discusses whether momentum returns are merely 52-week-high-based returns. In other words, this chapter analyzes whether stocks being near (far from) their 52-week high returns explain the momentum returns as general and whether the explanatory power changes when investor sentiment is controlled for. This chapter augments Hao et al. (2018), in which they show that price momentum and 52-week high momentum are different anomalies.

Results show that, in agreement with the current literature, investor sentiment has a positive relationship with both momentum and 52-week high. However, double sorting strategy results show that both of these anomalies are driven by behavioural factors and not risk factors. Results also show that investors react to winner and loser stocks differently, which is in line with the existing literature. Results also show that investors distinguish between winners (losers) that are near (far) from their 52-week high. The model used in this chapter regresses momentum returns from all of the different strategy combinations on the three- and five-factor model of Fama and French (1993, 2016).

The structure of the thesis is as follows: this is the first chapter which is the thesis introduction, the second, third and fourth chapters are independent chapters which are individually complete studies. Chapter two concerns the existence of the momentum returns along with the effect of investor sentiment. Chapter three concerns the effect of corporate governance on momentum returns. Chapter four concerns momentum returns and the effect of 52-week high controlling for investor sentiment. The fifth chapter concludes the thesis.

Appendix: Description of corporate governance provisions

Antigreenmail: Greenmail refers to a transaction between a large shareholder and a company in which the shareholder agrees to sell his stock back to the company, usually at a premium, in exchange for the promise not to seek control of the company for a specified period of time. Antigreenmail provisions prevent such arrangements unless the same repurchase offer is made to all shareholders or approved by a shareholder vote. Such provisions are thought to discourage accumulation of large blocks of stock because one source of exit for the stake is closed, but the net effect on shareholder wealth is unclear [Shleifer and Vishny 1986; Eckbo 1990]. Five states have specific Antigreenmail laws, and two other states have "recapture of profits" laws, which enable firms to recapture raiders' profits earned in the secondary market. We consider recapture of profits laws to be a version of Antigreenmail laws (albeit a stronger one). The presence of firm level Antigreenmail provisions is positively correlated with 18 outof the other 21 firm-level provisions, is significantly positive in 8 of these cases, and is not significantly negative for any of them. Furthermore, states with Antigreenmail laws tend to pass them in conjunction with laws more clearly designed to prevent take overs [Pinnell 2000]. Since it seems likely that most firms and states perceive Antigreenmail as a takeover "defense," we treat Antigreenmail like the other defenses and code it as a decrease in shareholder rights.

Blank Check: preferred stock is stock over which the board of directors has broad authority to determine voting, dividend, conversion, and other rights. While it can be used to enable a company to meet changing financial needs, its most important use is to implement poison pills or to prevent takeover by placing this stock with friendly investors. Because of this role, blank check preferred stock is a crucial part of a "delay" strategy. Companies that have this type of preferred stock but require shareholder approval before it can be used as a takeover defense are not coded as having this provision in our data.

Business Combination laws: impose a moratorium on certain kinds of transactions (e.g., asset sales, mergers) between a large shareholder and the firm, unless the transaction is approved by the Board of Directors. Depending on the State, this moratorium ranges between two and five years after the shareholder’s stake passes a prespecified (minority) threshold. These laws were in place in 25 states in 1990 and two more by 1998. It is the only state takeover law in Delaware, the state of incorporation for about half of our sample

Bylaw and Charter amendment limitations: limit shareholders' ability to amend the governing documents of the corporation. This might take the form of a supermajority vote requirement for charter or bylaw amendments, total elimination of the ability of shareholders to amend the bylaws, or the ability of directors (beyond the provisions of state law) to amend the bylaws without shareholder approval.

Control-share Cash-out laws: enable shareholders to sell their stakes to a "controlling" shareholder at a price based on the highest price of recently acquired shares. This works something like fair-price provisions (see below) extended to nontakeover situations. These laws were in place in three states by 1990 with no additions during the decade

A Classified Board (or "staggered" board): is one in which the directors are placed into different classes and serve overlap ping terms. Since only part of the board can be replaced each year, an outsider who gains control of a corporation may have to wait a few years before being able to gain control of the board. This slow replacement makes a classified board a crucial

component of the Delay group of provisions, and one of the few provisions that clearly retains some deterrent value in modern takeover battles [Daines and Klausner 2001].

Compensation Plans: with changes-in-control provisions allow participants in incentive bonus plans to cash out options or accelerate the payout of bonuses if there should be a change in control. The details may be a written part of the compensation agreement, or discretion may be given to the compensation committee.

Director indemnification Contracts: are contracts between the company and particular officers and directors indemnifying them from certain legal expenses and judgments resulting from lawsuits pertaining to their conduct. Some firms have both "In demnification" in their bylaws or charter and these additional indemnification "Contracts."

Control-share Acquisition laws (see Supermajority, below).

Cumulative Voting: allows a shareholder to allocate his total votes in any manner desired, where the total number of votes is the product of the number of shares owned and the number of directors to be elected. By allowing them to concentrate their votes, this practice helps minority shareholders to elect directors. Cumulative Voting and Secret Ballot (see below) are the only two provisions whose presence is coded as an increase in shareholder rights, with an additional point to the Governance Index if the provision is absent.

Directors' Duties: provisions allow directors to consider constituencies other than shareholders when considering a merger. These constituencies may include, for example, employees, host communities, or suppliers. This provision provides boards of di rectors with a legal basis for rejecting a takeover that would have been beneficial to shareholders. Thirty-one states have Directors' Duties laws allowing similar expansions of constituencies, but in only two of these states (Indiana and Pennsylvania) are the laws explicit that the claims of shareholders should not be held above those of other stakeholders [Pinnell 2000]. We treat firms in these two states as though they had an expanded directors' duty provision unless the firm has explicitly opted out of coverage under the law.

Fair-Price: provisions limit the range of prices a bidder can pay in two-tier offers. They typically require a bidder to pay to all shareholders the highest price paid to any during a specified period of time before the commencement of a tender offer, and do not apply if the deal is approved by the board of directors or a supermajority of the target's shareholders. The goal of this pro vision is to prevent pressure on the target's shareholders to tender their shares in the front end of a two-tiered tender offer, and they have the result of making such an acquisition more expensive. Also, 25 states had Fair-Price laws in place in 1990, and two more states passed such laws in 1991. The laws work similarly to the firm-level provisions.

Golden Parachutes: are severance agreements that provide cash and noncash compensation to senior executives upon an event such as termination, demotion, or resignation following a change in control. They do not require shareholder approval. While such payments would appear to deter takeovers by increasing their costs, one could argue that these parachutes also ease the passage of mergers through contractual compensation to the managers of the target company [Lambert and Larcker 1985]. While the net impact on managerial entrenchment and shareholder wealth is ambiguous, the more important effect is the clear decrease in shareholder rights. In this case, the "right" is the ability of a controlling shareholder to fire management without incurring an additional cost. Golden Parachutes are highly correlated with all the other

takeover defenses. Out of 21 pairwise correlations with the other firm-level provisions, 15 are positive, 10 of these positive correlations are significant, and only one of the negative correlations is significant. Thus, we treat Golden Parachutes as a restriction of shareholder rights.

Director Indemnification: uses the bylaws, charter, or both to indemnify officers and directors from certain legal expenses and judgments resulting from lawsuits pertaining to their conduct. Some firms have both this "Indemnification" in their bylaws or charter and additional indemnification "Contracts." The cost of such protection can be used as a market measure of the quality of corporate governance [Core 1997, 2000].

Limitations on director Liability: are charter amendments that limit directors' personal liability to the extent allowed by state law. They often eliminate personal liability for breaches of the duty of care, but not for breaches of the duty of loyalty or for acts of intentional misconduct or knowing violation of the law

Pension Parachutes: prevent an acquirer from using sur plus cash in the pension fund of the target to finance an acquisition. Surplus funds are required to remain the property of the pension fund and to be used for plan participants' benefits.

Poison Pills: provide their holders with special rights in the case of a triggering event such as a hostile takeover bid. If a deal is approved by the board of directors, the poison pill can be revoked, but if the deal is not approved and the bidder proceeds, the pill is triggered. Typical poison pills give the holders of the target's stock other than the bidder the right to purchase stock in the target or the bidder's company at a steep discount, making the target unattractive or diluting the acquirer's voting power. Poison pills are a crucial component of the "delay" strategy at the core of modern defensive tactics. Nevertheless, we do not include poison pills in the Delay group of provisions, but include it in the Other group because the pill itself can be passed on less than one-days' notice, so it need not be in place for the other Delay provisions to be effective. The other provisions in this group require a shareholder vote, so they cannot be passed on short notice. See Coates [2000] and Daines and Klausner [2001] for a discussion of this point.

Under a Secret Ballot (also called confidential voting): either an independent third party or employees sworn to secrecy are used to count proxy votes, and the management usually agrees not to look at individual proxy cards. This can help eliminate potential conflicts of interest for fiduciaries voting shares on behalf of others, and can reduce pressure by management on shareholder-employees or shareholder-partners. Cumulative Voting (see above) and Secret Ballots are the only two provisions whose presence is coded as an increase in shareholder rights, with an additional point to the Governance Index if the provision is absent.

Executive Severance: agreements assure high-level executives of their positions or some compensation and are not contingent upon a change in control (unlike Golden or Silver Parachutes).

Silver Parachutes: are similar to Golden Parachutes in that they provide severance payments upon a change in corporate control, but differ in that a large number of a firm's employees are eligible for these benefits. Since Silver Parachutes do not protect the key decision makers in a merger, we classified them in the Other group rather than in the Protection group.

Special Meeting limitations: either increase the level of shareholder support required to call a special meeting beyond that specified by state law or eliminate the ability to call one entirely. Such provisions add extra time to proxy fights, since bidders must wait until the regularly scheduled annual meeting to replace board members or dismantle takeover defenses. This delay is especially potent when combined with limitations on actions by written consent (see below).

Supermajority requirements: for approval of mergers are charter provisions that establish voting requirements for mergers or other business combinations that are higher than the thresh old requirements of state law. They are typically 66.7, 75, or 85 percent, and often exceed attendance at the annual meeting. In practice, these provisions are similar to Control-Share Acquisition laws. These laws require a majority of disinterested shareholders to vote on whether a newly qualifying large shareholder has voting rights. They were in place in 25 states by September 1990 and one additional state in 1991.

Unequal Voting rights: limit the voting rights of some shareholders and expand those of others. Under time-phased voting, shareholders who have held the stock for a given period of time are given more votes per share than recent purchasers. Another variety is the substantial-shareholder provision, which limits the voting power of shareholders who have exceeded a certain threshold of ownership.

Limitations on action by Written Consent: can take the form of the establishment of majority thresholds beyond the level of state law, the requirement of unanimous consent, or the elimination of the right to take action by written consent. Such requirements add extra time to many proxy fights, since bidders must wait until the regularly scheduled annual meeting to replace board members or dismantle takeover defenses. This delay is especially potent when combined with limitations for calling special meetings (see above).

Chapter Two: The existence of momentum

2.1 Introduction

Stock picking is one of the most difficult tasks in financial markets. However, there is a simple yet profitable trading strategy based on widely accessible information that looks at past returns and buys the winning stocks and shorts the losing stocks. This strategy yields abnormal returns of 1.49% per month (Jegadeesh and Titman, 1993). This trading strategy not only caused a debate in finance literature, as it violates the weak form of the EMH, but has been implemented by funds and individual investors all around the world. The weak form of the EMH states that market participants cannot make money based on past information or information that is widely available. Since momentum strategies sort stocks based on past returns and make abnormal profits, they challenge the validity of the EMH. The momentum strategy is not the only anomaly that sorts stocks based on widely accessible information: the contrarian strategy is another (De Bondt and Thaler, 1985), but momentum is the only one that is not explained by the three-factor model (Fama and French, 1993). Fama and French (1993) created their model by expanding the CAPM to include additional variables such as size and value. The three-factor model (3FF), as they called it, aims to show that that profit-earning anomalies are reliant on excessive risk-taking. The 3FF indeed explains other anomalies such as long-term reversal (De Bondt and Thaler, 1985), and size and value anomalies (Banz, 1981), but it could not explain momentum returns. Since the 3FF could not explain momentum returns, scholars looked at the robustness of the momentum returns in out-of-sample data and found that the momentum strategy is profitable.[5] Momentum returns are shown to not only be profitable in different time periods and in different countries but also in different markets, i.e. bonds, commodity, and currency markets.[6]

Other scholars moved from the robustness of the momentum returns to investigate the source of it. The current literature is still arguing whether the source of momentum profits is related to behavioural variables or risk-based variables. Over the years, scholars have argued that momentum returns should disappear as more investors act on the strategy and they find that

[5] Chan, Jegadeesh and Lakonishock (1996) establish that momentum existed between 1977 and 1993 in an out-of-sample dataset. Fama and French (2012) find that momentum is large and significant in international settings.

[6] Moskowitz, Ooi and Pedersen (2012) introduce time series momentum. They show that time series momentum is present in equity index, commodity and bonds.

momentum returns have indeed disappeared since the 1990s (Hwang and Rubesam, 2015; Bhattacharya, Li and Sonaer, 2017). These findings are crucial to momentum literature because if momentum returns have disappeared then there is little interest in knowing the source of it, or whether it is driven by behavioural or risk-based factors.

This chapter shows that over the whole tested period (1990-2018), momentum is positive, but is explained by the 3-factor and 5- factor and thus alphas are insignificant. Moreover, winners continue to win and produce positive and significant alphas for almost all the strategies. losers on the other hand, reverse and produce positive and insignificant alphas for most of the strategies. Only for the longer observation/holding periods a few significant alphas are observed. This shows that investors are slow to react to further bad news in the market when the news are about stocks that have been losing in the past. This chapter also test the effect of investor sentiment on momentum returns over the period between 1990 to 2018. During optimistic periods, momentum is highly positive, while during pessimistic periods momentum is low positive or negative. This is due to the cognitive dissonance effect, which affect investors to act in a timely manner when the news of specifc stock is in sync with the current sentiment while making investors act slowly when the news is not in sync with current sentiment. Empirical results show that during the optimistic period, momentum returns are driven by the loser portfolio continuation, due to the fact that investors are affected by the cognitive dissonance effect which makes them slow to react to bad news because it is not is sync with the current sentiment (optimistic). During pessimistic period on the other hand, the momentum returns are driven by the winner portfolio. Since the news of the winner portfolio is not in sync with the current sentiment, investors are affected by the cognitive dissonance effect and react with delay to the good news about the stocks. Loser portfolio experience high selling pressure since having both bad news and in pessimistic period and thus investors tend to oversell these stocks to a point where the reversal is imminent. This is shown with the strong reversal of losing stocks during the pessimistic periods. This chapter conducts additional tests to robust the results. Robustness checks are conducted by regressing the momentum returns on the three and five factor models of Fama and French (1993,2016). Results show that across the first period (1990-1999), momentum shows positive returns with positive but insignificant 3 and 5 factor model alphas for all strategies. Across the second period (2000-2009), momentum show positive returns with negative but insignificant 3 and 5 factor model alphas for all strategies. Across the third period (2010-2019), momentum show positive returns with positive and significant 3 and 5 factor model alphas for all strategies. The results as a whole show that

indeed the momentum has disappeared, meaning is explained by risk factor models, since 1990's, however momentum returns show that after 2010, risk factors, namely the three and five factor models of Fama and French (1993, 2016) could not explain momentum. The inability of the three and five factors models to explain momentum is the reason that scholars are researching the source of momentum returns. This chapter also conducts pressitince tests on momentum retruns which shows that momentum returns disappears after the first year which is consistent with the findings of Jegadeesh and Titman (1993).

The rest of the paper is organised as follows: section two tackles the history of the momentum trading strategy. Section three includes research questions and hypotheses. Section four covers the methodology and data. Section five will show the results and discussion and section six will conclude.

2.2 Research background

2.2.1 Introduction

When analyzing the history of the momentum strategy, it is important to see what drove scholars to look for momentum. Jegadeesh and Titman (1993) were following the steps of De Bondt and Thaler (1985), who discussed long-term reversal in cross-sectional returns – or contrarian returns as they called them. Contrarian returns are when stocks that have been going in one direction in the last period (12 to 24 months) reverse and go in the other direction for the next 2 to 3 years. However, this result came as a shock to the weak form of the EMH, which states that investors cannot make money based on past information or publicly available information. Even though the 3FF solved the puzzle related to the contrarian strategy by showing that it loads on the risk factor, along with the fact that it is the product of the January effect, the history of the contrarian strategy is important for understanding the momentum literature.

2.2.2 The contrarian strategy

De Bondt and Thaler (1985) paper was unique in that it presented a simple yet profitable trading strategy. The contrarian strategy is based on the premise that stocks that have been winning (losing) in the past period will reverse and become losers (winners). A trading strategy that shorts the winner and buys the loser would yield positive returns. Results show that loser stocks

outperform the market by an average of 19.6% 36 months after the formation period. Winner stocks generate 5% less than the market in the same period. They also find that most of the returns come from the month of January and that returns are much larger in the second and third year. De Bondt and Thaler believe that contrarian profits can be explained by the overreaction hypothesis, where investors overreact to news that drives the price of the stock away from its equilibrium price and thus it is due for a reversal. The overreaction hypothesis is based on the premise that investors overreact to unexpected news in the market. News shifts the equilibrium price but the actual price moves beyond the new equilibrium due to overreaction. After a period, rational investors realise this and correct the price back towards equilibrium by buying the losing stocks and shorting the winners. Results show that the reversal represents the magnitude of the original move. In other words, the higher (lower) the stock is from its fair value, the lower (higher) the reversal would be in the next period. Fama and French (1986) argue that returns of the contrarian profits are driven solely by size effect by testing the contrarian returns over sized-based portfolios. Their results show that there is some correlation between contrarian returns and size but it only explains part of the returns. The inability of the size factor to explain contrarian profits opened the door for more research on the source of contrarian profits.

Scholars have described the overreaction hypothesis in the terms of Kahneman and Tversky (1979) theory, which states that people overreact to unexpected events. Chan (1988) finds that winner and loser portfolios are correlated with market premium, which could lead to more sensitivity between contrarian returns and the way risk is measured. In their analysis, they use deciles when identifying past winners and losers instead of a specific number of stocks that happened to be extreme as in the previous period (35 stocks in De Bondt and Thaler (1985)). Using the CAPM betas, they show that contrarian profits are very small and insignificant. De Bondt and Thaler (1987) looked at the arguments raised by other scholars regarding the source of contrarian profits. In their original paper (1985) they compare the performance of the winner and loser portfolios during the formation period to performance in the holding period. They show that more extreme winners and losers have bigger reversals in the subsequent period. In their later paper (1987), they show that loser portfolios continue to decline in both short- and long-term formation periods. This means that the higher the stock price goes, the bigger the reversal. The winner portfolio, on the other hand, shows a negative relationship between January returns and the prior December. This could be due to capital gains tax, which is when funds tend to sell their losers and buy winners so they can present their holdings for that year

as a winning portfolio. They also show that earnings of the winner and loser portfolios have similar pattern in regard to the overreaction hypothesis. They confirm their original findings that the profits are due to the overreaction hypothesis. They reject other explanations like the January effect. Firm size and different risk parameters were tested, yet they could not explain the contrarian profits. The January effect was also studied in depth in their paper and they found that it is associated with capital gains tax. In other words, big investors like investment banks and funds sell their losers stocks and buy winners in January so they can present winning stocks to their investors along with the tax break they get by realizing a loss on their losing positions. To address the argument that contrarian profits are due to additional risk taking, they regressed the returns of the contrarian strategy on the CAPM model but could not explain the contrarian returns. Moreover, they show that the contrarian portfolio has a positive beta in up markets and a negative beta in down markets, which indicates that it is not a risky strategy.

2.2.2.1 Robustness of the contrarian strategy

The work of De Bondt and Thaler (1985, 1987) paved the way for other scholars to exploit more anomalies in the market that would put the EMH into question. Since the contrarian strategy was a simple yet very profitable strategy, other scholars have tried to look whether the same pattern is present in different countries and markets. Indeed, any trading strategy could be accused of data snooping. Thus, studies that follow the original paper try and test the strategy in different periods and different markets to establish its robustness. Many papers have tested the contrarian strategy in different markets and found the pattern is present, i.e. in the UK (Power et al., 1991; Campbell and Limmack, 1997; Macdonald and Power, 1993) and Spain (Alonso and Rubio, 1990). Other studies have tested longer holding periods to see whether contrarian profits persist over time. Forner and Marhuenda (2003) find significant returns for contrarian profits for a 5-year window when was tested in the Spanish stock market. Even though risk adjustment models could not explain the returns, the frequency would only yield a few observations since they are considering 5 years. Two different methods were used to conduct the contrarian profits: the arithmetic option market and a buy and hold strategy, and they both yielded similar results. Their findings support the overreaction hypothesis. The same pattern is also present in the German market and the French market. Mun, Vasconcellos and Kish (1999) used a nonparametric method to test a multifactor asset-pricing model (the 3FF of Fama and French, 1993). Results show that returns are not correlated with increased risk coefficients. In other words, the contrarian portfolio is not riskier than a diversified portfolio.

On the other hand, they show that investors immediately overreact to new news. This is because they find the short-term contrarian profits are higher than in the intermediate and long term.

2.2.2.2 Sources of contrarian profits

Since the contrarian pattern was found in different countries and markets, scholars started looking for the source of the contrarian profits. Some scholars attributed the abnormal returns to additional risk taking, while others believe they are explained by investor behaviour in response to new information becoming available. Early papers after the publication of the contrarian strategy have tested whether risk factors explain the contrarian returns. Chan (1988) argue that contrarian profits vary depending on how risk is measured. They find that CAPM betas fully explain contrarian abnormal returns. However, when implementing a test that measures the size effect, betas only explain part of the returns. They conclude that abnormal returns from the contrarian strategy are very sensitive to risk measurements. In other words, the exposure differs based on the risk model being used. When controlling for this sensitivity, abnormal returns diminish dramatically. Thus, the idea that abnormal returns are due to overreaction from investors is not accurate. Rather, the exposure to specific risk factors explains the returns. If returns were based on behavioural aspects, they would not change based on the way risk is measured. Ball and Kothari (1989) confirm the findings of Chan (1988), in which they show that the negative serial correlation in relative returns is due to changes in relative risk. More confirmation comes from Lo and Mackinlay (1990), who they test the contrarian strategy on weekly frequency, trying to directly test the overreaction hypothesis. They argue that for the overreaction hypothesis to work, price changes must be negatively autocorrelated for some holding period, which they find is partially true. The overreaction hypothesis does not explain returns fully but only partially. The cross effect among securities explains the other part of the contrarian profits. In other words, some stocks react more quickly to information. Alongside the risk-based explanation, Shleifer and Summers (1990) find that, even though investors may not be rational, a contrarian pattern exists because of the high risk of arbitrage, which in turn limits its role in correcting such a pattern.

On the other hand, other scholars have found that the De Bondt and Thaler (1985, 1987) overreaction explanation is reliable in explaining contrarian profits. Lakonishok, Shleifer and Vishny (1994) argue that abnormal returns from the contrarian strategy are due to investor behaviour rather than risk. They argue that investors get over-excited about glamour stocks and thus they overbuy them or oversell them. When compared to value stocks, these glamour stocks

do not appear to be riskier. However, they find that value stocks outperform glamour stocks between 1968 and 1990. This is due to the to the growth of earnings and cash flow of value stocks. However, investors overvalue glamour stocks, so some of the risk could be attributed to this. More support for the overreaction hypothesis comes from Jegadeesh and Titman (1995). They argue that stocks react with delay to common factors but overreact to firm-specific information. This leads to a lead-lag effect in stock returns. They conclude that liquidity motivated traders put pressure on stock prices, which causes return reversal. Yao (2012) argues that contrarian profits are due to the January effect and not overreaction. They study the US market from 1926 to 2009. Profits from the contrarian strategy disappear once they control for the January effect and the size effect. Other scholars have found that contrarian returns are highly correlated with herding behaviour in the Chinese stock market but they support the overreaction explanation (Chen, Hua and Jiang, 2018).

The debate on the source of contrarian profits almost concluded once Fama and French published their three-factor model (1993). In their model, Fama and French expanded on the CAPM model to include the size (SMB) and value (HML) factors. Since it was published, many anomalies of the EMH were explained by the 3FF, including contrarian profits. This means that contrarian profits were indeed driven by additional risk taken by loading on the risk factors, along with its loading on the January effect. Even though the 3FF model explained the majority of market anomalies, it failed to explain short-term continuation in cross section of returns – the momentum returns of Jegadeesh and Titman (1993).

2.2.3 Momentum strategy

After the work of De Bondt and Thaler (1985, 1987), Jegadeesh and Titman (1993) examined the cross section of returns in the intermediate horizon (3 to 12 months). Their strategy is conditional on past returns in determining future returns. They rank stocks based on their past returns and then divide the whole market into deciles. The top decile contains stocks with the highest returns in the past period and the bottom decile holds the lowest returns in the past period. They find that both the top and bottom deciles continue in the same direction for the next 12 months. In other words, stocks that performed well in the past continue to perform well in the future and stocks that performed poorly in the past continue to do so in the future. Their findings support De Bondt and Thaler (1985, 1987) in that when the portfolios are held for more than 12 months, they exhibit a reversal. Thus, they conclude that stocks go into a cycle driven by behavioural biases with short-term momentum and long-term reversal. Stock price

continuation violates the EMH, since the strategy is based on public information. Along with the momentum strategy, many anomalies of the EMH were challenged by Fama and French (1993). The introduction of the 3FF model explained the majority of market anomalies at the time but it failed to explain momentum returns. For that reason, momentum returns emerged as the threat to the existence of the EMH. In an attempt to defend the findings of the momentum strategy, Chan, Jegadeesh and Lakonishok (1996) conduct an out-of-sample study of momentum returns by looking at earnings as the source of momentum returns. In particular, they look at whether investors underreact to earnings news. They establish that momentum exists between 1977 and 1993. They find that momentum is profitable even after accounting for trading costs. They ask whether momentum profits are due to underreaction to earnings news and whether the reason behind such profits is that the market responds gradually to information. They argue that if momentum is solely dependent on earnings underreaction, a momentum strategy that is based on earning 'earning momentum' should not be exceeded by price momentum. Results show that momentum is not driven by positive feedback trading, and that investors react slowly or with surprise to earning announcements, with this surprise lasting for the next two announcements. They conclude that underreaction to news drives momentum returns. Underreaction is not specific to earnings news, however. Results show that each momentum strategy underreacts to different pieces of information, which could be earrings announcements or any other type of news. When regressed on the 3FF model, momentum returns have a significant positive alpha, meaning that risk factors cannot explain returns. This confirms the findings of Fama and French (1996) that the 3FF (1993) could not explain momentum and defends the findings of Jegadeesh and Titman (1993) by finding out-of-sample returns for momentum. This shows that momentum is not due to data snooping.

2.2.3.1 Out-of-sample findings

Since momentum was discovered in the US, further scholars have tested the pattern in different countries and in different markets like bonds, commodities and currencies. One of the first papers that studied the momentum pattern in mutual funds was Grinblatt, Titman and Wermers (1995), who study the behaviour of mutual funds and herding behaviour between 1974 and 1984. They find that 77% of mutual funds are momentum investors. Mutual funds do buy past winners but do not necessarily sell past losers. From all the mutual funds, those who trade on momentum have higher returns than the rest of the funds. However, there is only weak evidence that funds trade the same stocks. In other words, funds exhibit only a weak form of herding behaviour. They conclude that there is a strong link between momentum returns and mutual

funds' performance. Institutions are one of the big market players that capitalise on the momentum strategy. A study by Badrinath and Wahal (2002) found that institutions act as momentum traders when they make an entry but as contrarian traders when they close a position. Institutions include pension funds, investment advisors, insurance companies, commercial banks, investment banks and colleges and foundations.

More scholars show that momentum is not only present in the US market but also internationally. Rouwenhorst (1998) study 12 European countries between 1980 and 1995. Their results show that momentum is present in all the countries tested and it lasts for 12 months. Momentum returns are negatively correlated with firm size but also present in large firms. Moreover, momentum returns negatively load on size and market factors. Returns for the momentum strategy are also correlated with different strategy returns in the US market. Lui, Strong and Xu (1999) study the momentum strategy in the UK from 1977 to 1996. The UK market exhibits significant momentum that cannot be explained by cross sectional variation in unconditional mean returns of individual stocks. Momentum returns are robust to two subperiods of 11 years. Moreover, when testing the January effect, results show that momentum returns are higher when the month of January is excluded. Even when controlling for risk factors like size and book to market, momentum is still large and significant. They conclude that momentum is due to delayed response to either industry or firm specific information. Schiereck, De Bondt and Weber (1999) find that momentum is also present in the German market and could not be explained by risk factors. They conclude that the source of momentum could be purely human behaviour, since the results in Germany are very close to the results in the US market, even though both the culture and the economy of the two countries are different. A more conclusive study of 23 international markets between 1980 to 1995 using a weekly frequency reveals that momentum strategy is profitable in international settings (Chan, Hameed and Tong, 2000). Momentum returns arise mainly from time series predictability in stock market indices. They add that there is a positive relationship between momentum and trading volume, which confirms herding behaviour. Price continuation in individual stock indices drive the momentum returns. However, after controlling for beta, momentum returns diminish. Their findings reject the underreaction hypothesis. Other studies show that macroeconomic factors cannot explain momentum returns in international settings (Griffin, Ji and Martin, 2003). They find momentum to be large and significant in 39 countries, including good and bad economies. Momentum is also robust when applying stochastic dominance methods in international markets between 1989 and 2001. Returns are robust to

different subperiods and different risk characteristics. They conclude that looking for a rational explanation for momentum is a waste of time (Fong, Wong and Lean, 2005). Momentum is not only present in the stock market but also in 28 commodities in the commodity market from 1980 to 2003 (Shen, Szakmary and Sharma, 2007). Momentum in the commodity market is not only profitable but is as profitable as in the stock market. They find that risk factors could not explain momentum even after controlling for transaction costs. Shen, Szakmary and Sharma conclude that, generally, the commodity market has some risk. Buying and selling past winners and past losers increases risk because these are volatile commodities, but the traditional risk factors could not explain momentum. One of the most important papers that tests momentum returns in international settings is by Fama and French (2012). They conclude that momentum is present in all tested markets except Japan.[7] They add that momentum returns decrease in moving from small firms to large ones and that global models could not explain momentum returns. A more conclusive study that looks at a momentum pattern since the 1800s shows that momentum has been present since the nineteenth century (Geczy and Samonov, 2016). They add that the duration of the market state (up/down) affects the profitability of the momentum strategy. The longer the market state, the higher the momentum exposure. However, other studies show that momentum returns have disappeared since the 1990s, due to many investors acting upon it. Along with that, they argue that a decline in the risk premium, along with the growth rate in industrial production and the improvement in market efficiency affected the momentum pattern and made it disappear (Bhattacharya, Li and Sonaer, 2017).

2.2.3.2 The source of momentum profits

Previous sections covered out-of-sample findings concerning the momentum strategy. It is clear that the momentum pattern was not the product of data snooping, nor was it only observable in the US market. The momentum pattern was also present in other markets like commodity, currencies and bonds. Momentum is a strategy implemented not only by individual investors, but also by big investors like investment banks, mutual funds and other financial institutions. While it is clear that momentum is profitable in different markets, what drives momentum is not a clear. The literature is split between two ideas. The first is that momentum is associated with additional risk taking. In other words, stocks that have been going in one direction are overvalued/undervalued and buying/selling these stocks will carry some more

[7] Other country groups include: (i) North America (NA), which includes the United States and Canada; (ii) Japan; (iii) Asia Pacific, including Australia, New Zealand, Hong Kong, and Singapore; and (iv) Europe, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

additional risk and thus, momentum returns are compensation for that risk. The second idea is that momentum is driven by human behaviour related to how investors react when new information arrives. Investors, driven by behavioural biases, are slow to react to this information, making prices misrepresentative, which gives investors time to make profit.

2.2.3.2.1 Risk-based explanation

Jegadeesh and Titman (1993) show that stocks that have been going in one direction will continue to do so in the next intermediate term period. They believe that the source of this pattern is underreaction to news by investors. After the publication of the 3FF and the failure of the model to explain momentum returns, Fama (1998) argues that the EMH should not be discarded. He argues that if the over/underreaction is equally frequent then they will cancel out in the efficient market. If the anomalies split randomly between overreaction and underreaction, then it is consistent with the market efficiency. He adds that long term anomalies are very sensitive to methodology. If the methodology is changed, then the outcome will also change. He supports his argument by finding that past-event continuations of previous abnormal returns are about as frequent as post-event reversals. Failure of the 3FF model to explain momentum returns does not mean that momentum is purely driven by behavioural biases. One could argue that 3FF model is only a model and has its limitations. More studies may show that risk variables aside from the three factors contribute to the momentum returns. Moskowitz and Grinblatt (1999) argue that momentum is driven by industry-specific returns. They introduce a momentum strategy based on industry returns. They buy stocks from winning industries and short stocks from losing industries. The industry momentum strategy shows strong profitability that exceeds price momentum returns. Returns are robust to controlling for size, book to market, price momentum and the cross-sectional dispersion in mean returns. They also show that price momentum loads on industry momentum. This means that price momentum is simply driven by industry momentum and that when accounting for industry momentum, price momentum returns diminish.

There are two unique characteristics that distinguish industry momentum from price momentum. The first is that industry momentum is most profitable at the one-month horizon, where it is not typically tested when looking at price momentum. However, this does not mean that industry momentum is not profitable at the 6-month horizon, which typically the most profitable period for price momentum. In fact, industry momentum is as profitable as price momentum at the 6-month horizon. The second characteristic that distinguishes industry

momentum from price momentum is that it is profitable in the largest and most liquid stocks, where price momentum is typically large in small stocks, but also present in large ones. They argue that, since Jegadeesh and Titman (1993) momentum is mainly driven by industry momentum and that industry momentum portfolios will contain highly correlated stocks, this strategy is not well diversified and thus should not be considered as arbitrage opportunity. These findings open a new path for momentum to exploit but one could argue that finding that price momentum is driven by a different type of momentum does not solve the puzzle of momentum source. It is good information that such a pattern is driven by a slightly different pattern but the big question is why both patterns exist remains. The fact that industry momentum drives price momentum in the US market does not mean that is the case everywhere else. Nijman, Swinkels and Verbeek (2004) show that momentum is also present in European markets but it is driven by individual stocks and not industry stocks. Grundy and Martin (2001) show that momentum returns are not explained by either the industry effect or the cross section of expected returns. They replicate the method of industry momentum while skipping one month between formation period and holding period. The industry effect alone does not have the power to fully explain momentum return. They argue that their findings show that stocks that load on the risk factors during the formation period are more likely to be in the winner and loser portfolio but the difference between the two portfolios (momentum) as a whole does not load on the risk factors. However, they conclude that the momentum effect is just a fact of the market that should be accepted. As such it should be included as an explanation factor for returns, just like the size and value effects. This is exactly what Carhart (1997) does by adding a MOM factor to the 3FF model in an attempt to explain mutual funds' performance. However, the literature did not settle for momentum returns simply being a risk factor. Efforts to find the source of momentum profits continue. Chordia and Shivakumar (2002) take a new approach by looking to a set of highly correlated variables to explain momentum returns. They analyze macroeconomic factors related to business cycles. They show that profits from a momentum strategy could be captured by a set of macroeconomic factors. These include dividend yield, default spread, yield on the 3-month T-bill and term structure spread. They also add that macroeconomic factors also explain industry momentum. However, industry momentum and stock momentum are different phenomena since they react differently to macroeconomic factors. Their findings are challenged by Cooper, Gutierrez and Hameed (2004), who study of the effect of market states on momentum returns. Cooper, Gutierrez and Hameed show that an adjustment to the methodology to account for microstructure concerns keeps macroeconomic factors from explaining momentum returns. Since the momentum strategy contains

overlapping portfolios that need balancing each month, it is crucial to study the effect of transactions cost on momentum returns, since these costs occur each month. Korajczyk and Sadka (2004) show that accounting for the price impact of trading leads to a decline in profitability of momentum. However, they find that transaction costs do not erase momentum returns fully. Lesmond, Schill and Zhou (2004) argue that momentum profits do not even exist, but simply reflect the cost of arbitrage. Arbitrage costs create the illusion that there is an anomaly in price behaviour. Their argument assumes that tackling momentum stocks, which are drifting away from their fundamental value, is a risk. If arbitragers know that stocks that have been going in one direction will continue to do so in the next short period, they will be hesitant to quickly react upon this information. Rather they will wait longer for the stock to drift even further away from its equilibrium value. Then, the short or long position will be more profitable. There is a small problem with this argument: if the arbitragers react all at once, their pressure will prevail and the stock price will only have a marginal drift from its equilibrium value. Since they wait and act in different times, prices continue to drift.

Other scholars have argued that momentum returns are not based on the market as a whole but rather are driven by firm-specific characteristics. Sagi and Seasholes (2007) study firm-specific information and its effect on momentum returns. Firms with high market-to-book ratios produce enhanced momentum profits and high book-to-market stocks produce 10% higher momentum than lower ones. They also find that low cost of goods firms produces higher momentum than lower ones. High revenue volatility firms also produce higher momentum than lower revenue volatility ones. Some papers have argued that momentum is not necessarily an all-year strategy. They suggest that momentum is driven by earnings announcements and that momentum is at its highest levels at those times. Sias (2007) shows that, excluding January returns, quarter-ending months yield significantly higher momentum returns. The pattern is stronger for stocks with a high institutional investor share and in December. They argue that if window dressing and tax selling by institutional investors contributes to momentum returns, then momentum will be more discoverable over time and will be greater in quarter ending months and momentum will be greater for stock with high institutional investors. They show that momentum had strong seasonality for the past 20 years. Chordia and Shivakumar (2005) show that price momentum is captured by systematic components of earnings momentum. They conclude that earnings surprises and past returns are related but they have different explanatory power for future returns. Since the contrarian strategy was explained by the January effect and the 3FF model, Yao (2012) study the effect of January on momentum

returns. They show that contrarian profits are basically a January effect. Without the month of January, contrarian profits are considerably reduced. On the other hand, momentum cannot be explained by the January effect. Volatility risk has also been tested in regards to momentum returns. Daniel and Moskowitz (2013) show that momentum returns are negatively skewed. They experience infrequent but strong and persistence negative returns around panic states. This is due to the high premium attached to options like payoff of losers. When avoiding these crashes, momentum returns are doubled. Volatility risk is correlated with momentum but does not explain momentum during panic periods. Barroso and Santa-Clara (2015) confirm these findings by showing that momentum offers the highest ratios but it has the worst crashes, which is not ideal for investors who do not like negative skewness and kurtosis. Risk of momentum changes over time. When the risk is managed, momentum doubles its Sharpe ratio. These results are robust in the international market. They also show that transactional costs for adjusted momentum are 40% higher than conventional momentum.

Momentum could also be driven by a different momentum pattern. Moskowitz, Ooi and Pedersen (2012) introduce time series momentum, in which they show that time series momentum is present in equity index, commodity and bonds. Consistent with the sentiment thesis of initial underreaction and delayed overreaction, returns of momentum have little exposure to standard asset pricing factors. Time series momentum is different from cross sectional momentum but they are related. A challenge for behavioural theories is that time series momentum is consistent across different markets which have different type of investors. Lim, Wang and Yao (2018) show that time series momentum is positive from 1927 to 2017. It is not specific to subperiod, firm size, different formation or holding periods or different markets. Standard risk factors could not explain momentum. Momentum is conditional on market states, information regarding specific stocks and investor sentiments. Since momentum was highlighted in the 1993, scholars have argued that with time, momentum will disappear as more investors react to it. Hwang and Rubesam (2015) show that momentum was only present from 1940 to 1990. Since then, momentum has disappeared. They believe that bubbles account for more than 50% of momentum profits.

2.2.3.2.2 Behavioural explanations

Jegadeesh and Titman (1993) argued that their findings show that momentum is driven by underreaction to news. However, they did not go into detail on why investors would underreact to news. At the time of publication, the idea that investor might not be rational all the time and

might experience behavioural biases was new in the literature. One of the first papers that tackled the underreaction to information is Chan, Jegadeesh and Lakonishok (1996), in which they examine investor underreaction to earnings news specifically between 1977 and 1993. They show that market risk, size and book-to-market do not explain momentum, which is consistent with Fama and French (1996). Results confirm that the market responds gradually to new earnings information. When the market is surprised by an earnings announcement, it continues to be surprised for the next two announcements. However, each momentum strategy is affected by market underreaction to different pieces of information, which could be earning surprises or any other information. They confirm the findings of Fama and French (1996) that the 3FF model does not explain momentum, which gives momentum more attention in the literature being the only pattern that could not be explained by the risk factors. They conclude by controlling for transaction costs and they find that even though transaction costs take away a big portion of the momentum profits, momentum is still profitable. Daniel and Titman (1999) give more explanation on why stocks exhibit underreaction. They show that overconfidence affects investor decisions, which leads them to react to news slowly and thus underreact to information. What also fuels this underreaction is that investors are required to analyze the news and to comprehend the effects of new information. This is true for stocks where valuation requires interpretation and ambiguous stocks. Book-to-market is used as a proxy to determine whether the companies are simple to value. Low book-to-market companies have more growth options and thus should exhibit more overconfidence. In their analysis, they show that the 3FF model does not explain momentum returns. They also take it a step further by looking at whether the adaptive market hypothesis can explain momentum returns. The adaptive market hypothesis suggests that some investors are rational and that they act as arbitragers to eliminate any excess returns. Since momentum returns persist for 10 years, the adaptive market hypothesis is rejected (Lo, 2005). Lee and Swaminathan (2000) study the effect of volume in explaining momentum returns. Trading volume predicts the magnitude and persistence of price momentum and is shown to be a good predictor of price reversal. High volume winners and low volume losers exhibit quicker reversals. In general, when sorting all stocks based on past returns, high volume portfolios experience high levels of momentum, while low volume portfolios exhibit lower levels of momentum. This is due to the liquidity of the companies. More liquid stocks have more momentum. However, they do not link trading volume to underreaction to news. Trading volume should act as a proxy for underreaction. Since underreaction by definition is when investors are slow to react to information, trading volume should gauge how investors underreact to news. One would argue that since momentum is low

in low trading volume portfolios and high in high volume portfolios, underreaction theory does not fully explain momentum returns. In their paper they have only three volume portfolios. In other words, they divide all companies into three different volume portfolios. More robust analysis would divide the market into 5 or 10 volume portfolios. They look at the change in volume rather than absolute volume. They sort stocks into 5 portfolios based on their change of volume. In this analysis, however, larger changes in volume yield lower momentum returns and low changes in volume yield more momentum. This is crucial to the theory of Hong and Stein (1999) that momentum is high when information diffuses gradually, and low changes in volume indicate gradual diffusion of information. However, Lee and Swaminathan (2000) believe that the absolute volume measure is more accurate, since the volume change model has its limitations in explaining the 3- and 4-years momentum returns. They reject the theory of Hong and Stein. They also introduce the momentum cycle in which trading volume plays a large part in determining the position of stocks in the momentum cycle. They find that firms with high post turnover ratios exhibit glamour characteristics, earn higher levels of future returns and have negative earnings surprises for the next eight quarters. They conclude that prices do not normally reflect the fundamental value of stocks. Chen, Jegadeesh and Lakonishok (1999) conduct a study of momentum while controlling for earnings momentum. They are motivated by the premise that momentum is mainly driven by underreaction to news and news about earnings is the most significant in terms of affecting the firm's valuation. They show that during the periods of 1973–93 and 1994–98, momentum yields profits over 6 to 12 months. Sorting stocks solely based on past earnings, however, diminishes returns after controlling for transaction costs. They reject the idea that momentum is driven by delayed trend chasing, where investors rush to buy previous winners or sell previous losers. The market in general is slow to react to new information and incorporate the full impact of information. However, much of the momentum returns are concentrated around earnings announcements. Analysts contribute to this delay by having a slow response on revising their initial predictions. They conclude that the conservatism bias of Barberis, Shleifer and Vishny (1998) is the reason for such results.

Barberis, Shleifer and Vishny (1998) present a model of investor sentiment that mainly tackles how investors form their beliefs that lead them to make financial decisions. The investor sentiment model is driven by representativeness bias (Tversky and Kahneman, 1974). Representativeness bias means that investors would consider the high probability outcomes as a given while ignoring the low probability outcomes. They also consider conservatism bias per

the work of Edwards (1968). Conservatism bias means that investors are slow in updating their beliefs when facing new information. They develop the model to analyze whether underreaction to news drives momentum returns. They conclude that conservatism bias drives underreaction to news, which fuels momentum returns. Daniel, Hirshleifer and Subrahmanyam (1998) develop a similar model to address the source of momentum returns. Their model is based on using behavioural biases to explain what drives investor behaviour and thus momentum returns. Specifically, their behavioural model is based on investor overconfidence and self-attribution. Their goal is to present a testable behavioural model for over- and under-reaction. The behavioural theory presented in their paper can be summed up as the idea that investors overreact to private information and underreact to public information. They show that short-term underreaction is followed by long-term overreaction, which implies that under- and over-reaction are connected phenomena. Conrad and Kaul (1998) develop a model to address the source of momentum profits by decomposing the returns. They believe that momentum returns are driven by cross sectional variation in mean returns, which is the reason why contrarian strategy is not as successful. Jegadeesh and Titman (2001) study the persistence of momentum returns. Results show that there is no reversal for momentum in 2–3 years after portfolio formation, but there is significant reversal in 4–5 years. These findings reject the theory of Conrad and Kaul (1998) that winners will always yields higher returns than losers. They sum up the behavioural explanation of momentum source to be based on how investor bias affects decision making when dealing with new information. On the other hand, the rational explanation is based on variation in cross sectional mean returns, rather than predictable time series variations. Hong and Stein (1999) and Hong, Lim and Stein (2000) address the core source of the momentum strategy, which is how information affects investor behaviour. They argue that momentum is dependent on how fast or slow investors react to new information. The reaction of investors is fundamentally linked to how fast news reaches investors. In other words, they look for the effect of information diffusion in the market. They find that when information travels gradually in market, it reaches investors in waves and thus each group of investors reacts to the news at different times. This would create momentum as more and more investors buy (sell) the stock in reaction to the good (bad) news. They also argue that when information diffuses quickly, the market as a whole reacts to the news at the same time and thus the price will reflect the equilibrium price, which eliminates momentum. In other words, momentum is higher when information diffuses gradually in the market but lower when it diffuses quickly. In their paper, they use the number of analysts covering a stock as a proxy for information diffusion.

Some studies show that momentum is affected by small traders rather than large ones. Hvidkjaer (2006) show that buying pressure from small traders exists for losing stocks, which converts into intense selling pressure over the next year. This is consistent with findings of initial underreaction in the short term and overreaction in the long term. They show that imbalance in small trades during the formation period affects momentum returns. In a more recent paper, Chui, Titman and Wei (2010) test how culture affects momentum profits. Individualism is positively associated with trading volume and volatility as well as the magnitude of momentum profits. These findings are significant, since momentum is observed in many different countries that vary in their economies and culture. They argue that momentum is driven by risk factors rather than investor behaviour is just ignoring the obvious. Not only is momentum linked to individualism but also about how they feel during a specific market state. Wang and Xu (2015) use the VIX index, which is an index that measures the volatility of the market and usually used to gauge the fear of investors in the market, as a proxy for degree of fear and test it with momentum returns. VIX is an index that is traded in the US market in which it shorts the US market. It is a good proxy for how investors feel at a specific momentum in time. Even though VIX could capture investor fear, it is still a traded security that traders might buy and sell for specific reasons and not only when they are feeling fear. There is strong negative relationship between VIX and momentum returns. These findings are consistent with the behavioural explanation of momentum returns. Conrad and Yavuz (2017) show that momentum stocks do not exhibit a long horizon reversal, which indicates that momentum and reversal are two different phenomena. There is less than a random chance that momentum stocks would reverse in the future up to 5 years. The reversal of the momentum strategy arises from the persistence of returns that exhibit contrarian behaviour.

There are several papers that tries link momentum returns to the underreaction to news, including Avramov et al., (2007), that links credit ratings to momentum returns. Their strategy splits the market into low credit rating firms and high credit rating firms. Within each group, they implement a momentum strategy. Findings show that momentum among companies with high credit rates yields insignificant returns of 0.07% per month, while companies with low credit ratings yield 2.04% per month. These results are robust adjusting for industry momentum, size effect and the three-factor model. Low credit rating firms exhibit a momentum pattern because these companies take on riskier projects in hopes of improving the firm's rating statues. When these projects do well, investors underreact to it and momentum is created. They conclude that over the formation period, firms' characteristics change. Sales growth, profit

margins, operating cash flow and interest coverage decline for losers and increase for winners. This is driven by operating performance and the market does not anticipate such changes. Thus, when the market starts realizing this, the buy the winner and sell the loser, creating momentum profits. Of course, such findings make the case that momentum could be driven by risk-based factor changes such as sales growth, profit margins, operating cash flow and interest coverage. However, I argue that the continuation of price movement happens because the market did not anticipate the changes nor the performance of such low credit rating stocks, and thus they react with a sense of urgency. This urgency is driven by behavioural biases and not rational ones; thus, even though credit rating has a negative relationship with momentum, it might not be the true driver of it.

2.2.4 Summary

Over the past decade, many papers have established the existence of momentum patterns not only in the US market but in different international markets as well. Moreover, momentum was shown to be profitable not only during the initial period but also during other time periods. Stocks are not the only assets that exhibit momentum; commodities, currencies, and bonds do too. The most common feature between all of these findings is the human factor. Many other papers have tackled the source of momentum and whether it is driven by behavioural biases or by risk factors. Still, the literature is still producing new variables that try to explain momentum returns.

2.3 Research question and hypothesis

The nature of momentum has long been debated: both its existence and whether it is driven by behavioural biases or risk factors. Scholars from both schools of thought provide strong arguments to support their claims. Thus, as of today, scholars are still researching the source of momentum returns. Other scholars have called for an end for searching for the source of momentum. Grundy and Martin (2001) believe that many of the explanations for momentum returns are dependent on the model that explains it. When the model is marginally changed, it fails to explain momentum. They believe that momentum should be used as a factor when explaining returns, reflecting the fact that scholars have failed to explain momentum fully. Fong, Wong and Lean (2005) have argued that, after applying a stochastic dominance analysis to examine momentum, it shows strong persistence. They suggest that looking for a rational

explanation for momentum is a waste of time. Other scholars have argued that momentum returns are limited to a specific period. They show that momentum disappears when many market participants act upon it. Their results show that momentum returns have not existed since the 1990s (Hwang and Rubesam, 2015). They believe that momentum returns are derived from bubbles in the first place, which account for more than 50% of momentum returns. Bhattacharya, Li and Sonaer (2017) confirm these findings, showing momentum have disappeared since the 1990s. They argue that this is due to more investors reacting on momentum returns and thus they arbitrage the profits away. In theory these arguments have some truth. If indeed investors act upon momentum, then momentum will disappear or will be very minimal. If investors react quickly to news, they will drive the price to its equilibrium price very quickly and momentum will be eliminated.

This study analyzes whether momentum still exists in the market and whether the disappearance of momentum returns since the 1990s was temporary or is still ongoing. Using a dataset that runs from January 1990 to December 2018, will have 5 additional years to study compared to Bhattacharya, Li and Sonaer (2017). This data can also offer a test of whether investor sentiment still affects momentum returns and whether momentum is robust to the use of specific subperiods.

2.3.1 Research questions

1. Does momentum exist when including the last decade of dataset?
2. Does momentum returns vary depending on specific period?
3. Does investor sentiment affects momentum returns?

2.3.2 Hypotheses

H_1: Stocks past returns have a positive relation with its future returns.

H_2: Momentum returns are not conditional on specific time period.

H_3: Investor sentiment has negative relation with future returns.

2.4 Data and methodology

2.4.1 Data

Data consists of all trading stocks in the US market from January 1990 to December 2018 from the Center of Research in Security Prices (CRSP) database. Stocks that below $5 are excluded at the point of portfolio formation as well as all stocks that are in the lowest NYSE decile. The investor sentiment data are based on Baker and Wurgler (2006) and downloaded from their website[8].

2.4.2 Methodology

Analysis is split into subperiods. The first analysis tests for momentum from January 1990 to December 2018 to establish whether momentum exists across the entire window. Additional analysis uses subperiods that identify specific market states. Then, separate time windows will be tested, from January 1990 to December 1999, from January 2000 to December 2009 and from January 2010 to December 2018, allowing for a test of whether momentum is period related.

2.4.2.1 Momentum

At the beginning of any period, stocks must at least have 12 months of past returns. This is crucial because the longest observation and holding period considered will be 12 months and the sample of stocks should not change across analyses. Momentum portfolios are constructed following Jegadeesh and Titman (1993). The momentum strategy uses an overlapping portfolio, whereby at any given month t, the strategy holds a series of portfolios that have been selected in the current month and in each previous month, up to $K - 1$ months ago (K holding periods). Returns are examined from time t to $t - J$ (J observation periods). At a given month t, all companies are ranked based on their previous returns. Ten portfolios are formed based on deciles, where P10 is the top 10% of all companies ranked on their average past returns and P1 is the lowest 10% of all companies ranked on the same metric. The portfolio is long P10 and short P1. Holding periods of 3, 6, 9 and 12 months and observation windows of 3, 6, 9 and 12 months are each considered, producing a total of 16 different strategies. The same strategy

[8] http://people.stern.nyu.edu/jwurgler/

is repeated each month to create overlapping portfolios. Thus, the monthly momentum return is the equally weighted return across all the monthly overlapping portfolios.

2.4.2.2 Investor sentiment

Tests of the impact of investor sentiment on momentum use sentiment data from Baker and Wurgler (2006). This data will allow analysis to determine how investors react when sentiment is low and when its high, how this sentiment affect their reaction to news and at what pace, if at all.

2.5 Empirical results and discussion

2.5.1 Momentum returns

To test the first hypothesis of whether past returns still affect future returns, and to answer the question raised by Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017) of whether momentum has indeed disappeared since the 1990s, the momentum strategy is implemented between the years January 1990 to December 2018.

In the first analysis, the momentum strategy is implemented over the period from January 1990 to December 2018. The momentum strategy is implemented using an observation period J of 3, 6, 9 or 12 months, determining the time window in which to determine which stocks are winners and which are losers, and a holding period K of 3, 6, 9 or 12 months, to determine how long to hold each long/short position. To avoid the risk of bid and ask spreads, analysis skips a month between observation period and the time the portfolio is formed. At each month t, the same method is repeated, producing overlapping portfolios. In the first month t, one portfolio is formed. By $t + J$, the full set of portfolios is formed. This method is used to create winner and loser portfolios. Monthly returns for each specific portfolio are the average of all holding portfolios at that month. Momentum is calculated as the difference between the average holdings of the winner portfolio and the loser portfolio. Table 2.1 shows the results for the full period from January 1990 to December 2018. The analysis shows that momentum is present for a sample including data up to December 2018, which contradicts the findings of Hwang

and Rubesam (2015)[9] and Bhattacharya, Li and Sonaer (2017).[10] Moreover, momentum returns are small for shorter observation and holding periods and starts to increase as with both J and K. It peaks at $J = 9$ and $K = 3$, with 0.56% average monthly returns, which translates into a 6.89% annual return. This pattern is consistent with the findings of Jegadeesh and Titman (1993) when they show that momentum starts small but peaks around the middle periods, and then diminishes after 12 months. All of holding periods of 12 ($K = 12$) show very small returns, and when $J = 12$ and $K = 12$ as well, momentum returns are negative. Moreover, the loser portfolio is always positive, which is also consistent with the findings of Jegadeesh and Titman's paper. There is a strong reversal of the loser portfolio at more than a 3-month holding period ($K = 3$). This means either that investors do step in and buy losing stocks that have been losing for the past 3 months, as they believe they are away enough from their equilibrium price to make a profit, or that the underreaction cycle for the loser is short. In other words, losing stocks exhibit quick initial reaction to news, which drives the price away from its equilibrium and raises an opportunity for arbitragers to step in and correct this action by buying stocks back. To note, at $K = 3$, these stocks are the most losing stocks in the past 3 months. Under rational expectations, the loser stocks are not expected to reverse. This opens the door for more behavioural explanations to be explored. On the other hand, the winner portfolio shows a strong continuation that lasts for 12 months, or even more. Winner returns start small but increase with the holding period. This pattern indicates that the winner portfolio is in its early cycle of underreaction and that investors are still buying past winners even after 24 months. Looking at $J = 12$ and $K = 12$, investors are buying winning stocks that have been wining in the previous year; investors continue to buy these stocks for up to two years. This indicates that underreaction to news can last for up to two years since the first observation month for winning stocks.

[9] Hwang and Rubesam (2015) show that momentum is large and significant only during specific periods prior to 1990s. It is attributed to bubbles in the market. Their study uses data between 1927 to 1999.

[10] Bhattacharya, Li and Sonaer (2017) show that momentum disappeared after the 1990s when using a dataset that spans 1990 to 2012. They show some positive returns but no significant alphas of momentum when regressed on the three-factor model.

Table 2.1
Momentum Returns

Cross-sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over *J* months in ascending order, and split into 10 equally weighted portfolios, where P10 is the winner portfolio and P1 is the loser portfolio. P10 is bought and P1 is sold. Average monthly returns are presented in this table. The sample period is January 1990 to December 2018.

J	***K***	**3**	**6**	**9**	**12**
3	L	0.0072	0.0070	0.0068	0.0079
	W	0.0093	0.0098	0.0101	0.0097
	W-L	0.21%	0.27%	0.32%	0.18%
	Ann	2.57%	3.31%	3.94%	2.17%
6	L	0.0064	0.0065	0.0072	0.0082
	W	0.0109	0.0112	0.0107	0.0098
	W-L	0.45%	0.47%	0.34%	0.16%
	Ann	5.54%	5.81%	4.22%	1.91%
9	L	0.0062	0.0071	0.0082	0.0091
	W	0.0118	0.0110	0.0101	0.0094
	W-L	0.56%	0.39%	0.20%	0.02%
	Ann	6.89%	4.77%	2.37%	0.29%
12	L	0.0076	0.0086	0.0094	0.0100
	W	0.0108	0.0100	0.0094	0.0088
	W-L	0.31%	0.15%	0.00%	-0.12%
	Ann	3.84%	1.79%	0.00%	-1.43%

Overall, momentum returns are driven by the continuation of the winning stocks rather than the losing ones. This is consistent with the findings of Jegadeesh and Titman (1993). These findings support the hypothesis that future returns are conditional on past returns. Since the momentum strategy yields positive returns, it is crucial to see whether these returns are simply compensation for risk. For that, a regression analysis in conducted of the average monthly returns of the momentum strategy on the three- and the five-factor model of Fama and French (1993, 2016). When regressing the momentum returns over the three-factor model, results show in table 2.2 that almost all of the momentum strategies have a positive alpha, except when holding the portfolio for 12 months. However, all of the alphas are statistically insignificant. The same pattern is observed when regressing the momentum returns on the five-factor model. Analysis show that alphas are negative when holding the portfolio for 12 months but otherwise they are positive. Momentum returns show no significance in any of the different periods that have been tested. The results indicate that momentum returns during this period are explained by the risk factors and so carry additional risk. These findings are consistent with the two papers discussed earlier that show that momentum disappeared after the 1990s.

Table 2.2
Momentum returns regression analysis

This table shows alphas and the p-value on the alphas from a regression of momentum portfolio returns on the three-factor model of Fama and French (1993) and five-factor model of Fama and French (2016), which include RM-Rf (The market premium factor), SMB (the size factor), and HML (the value factor) (three factor) and additionally RMW (The priftability factor) and CMA (The investment factor) (five factor). The analyzed period is between Jan 1990 to Dec 2018.

	Three-factor model					**Five-factor model**				
J	***K***	3	6	9	12	***K***	3	6	9	12
3	α	-0.0001	0.0006	0.0010	-0.0001	α	0.0000	0.0007	0.0007	-0.0001
	P-value	(0.9623)	(0.7684)	(0.6517)	(0.9251)	P-value	(0.9807)	(0.7564)	(0.7564)	(0.9318)
6	α	0.0025	0.0029	0.0017	-0.0001	α	0.0026	0.0030	0.0018	-0.0001
	P-value	(0.3746)	(0.2355)	(0.3983)	(0.9496)	P-value	(0.3741)	(0.2360)	(0.3957)	(0.9386)
9	α	0.0029	0.0023	0.0005	-0.0013	α	0.0030	0.0025	0.0006	-0.0012
	P-value	(0.2355)	(0.3329)	(0.8340)	(0.5274)	P-value	(0.2360)	(0.3264)	(0.8081)	(0.5493)
12	α	0.0017	0.0001	-0.0014	-0.0026	α	0.0020	0.0003	-0.0013	-0.0026
	P-value	(0.5113)	(0.9559)	(0.5411)	(0.2135)	P-value	(0.4775)	(0.9196)	(0.5870)	(0.2387)

To understand the reason behind the results, the same three- and five-factor model regression analyses is conducted on the winner and loser portfolios separately. This is to show whether one portfolio's risk is influencing the whole momentum returns. Table 2.3 below shows the results.

Table 2.3
Regression analysis, 1990–2018

This table shows alphas and the p-value on the alphas from a regression of winner and loser portfolio returns on the three-factor model of Fama and French (1993) and five-factor model of Fama and French (2016), which include RM-Rf (The market premium factor), SMB (the size factor), and HML (the value factor) (three factor) and additionally RMW (The profitability factor) and CMA (The investment factor) (five factor). The analyzed period is between January 1990 to December 2018.

		Panel A: three-factor model							
J	***K***	**3**		**6**		**9**		**12**	
		L	**W**	***L***	**W**	***L***	**W**	***L***	**W**
3	α	0.0047	0.0068	0.0044	0.0073	0.0044	0.0077	0.0051	0.0072
	P-value	(0.225)	(0.0146)	(0.2411)	(0.0091)	(0.2336)	(0.006)	(0.153)	(0.0114)
6	α	0.0039	0.0086	0.0037	0.0089	0.0044	0.0084	0.0053	0.0075
	P-value	(0.3368)	(0.002)	(0.3374)	(0.0013)	(0.2427)	(0.0029)	(0.145)	(0.0079)
9	α	0.0035	0.0097	0.0043	0.0089	0.0052	0.0079	0.0061	0.0071
	P-value	(0.3794)	(0.0005)	(0.2698)	(0.0015)	(0.1659)	(0.0046)	(0.0973)	(0.0109)
12	α	0.0047	0.0087	0.0056	0.008	0.0063	0.0072	0.007	0.0066
	P-value	(0.2297)	(0.0018)	(0.1486)	(0.0044)	(0.0938)	(0.0097)	(0.0603)	(0.0175)

Panel B: five-factor model

J	*K*	3		6		9		12	
		L	W	***L***	W	***L***	W	***L***	W
3	α	0.0057	0.0079	0.0055	0.0084	0.0054	0.0087	0.0061	0.0082
	P-value	(0.153)	(0.0063)	(0.1638)	(0.0039)	(0.1594)	(0.0026)	(0.0993)	(0.0055)
6	α	0.0049	0.0097	0.0047	0.01	0.0054	0.0094	0.0064	0.0085
	P-value	(0.2471)	(0.0008)	(0.2448)	(0.0005)	(0.1688)	(0.0012)	(0.0951)	(0.0038)
9	α	0.0045	0.0108	0.0052	0.01	0.0062	0.009	0.0071	0.0081
	P-value	(0.2814)	(0.0002)	(0.192)	(0.0006)	(0.1148)	(0.002)	(0.0643)	(0.0052)
12	α	0.0057	0.0099	0.0065	0.009	0.0073	0.0083	0.008	0.0076
	P-value	(0.1657)	(0.0007)	(0.1034)	(0.0019)	(0.0643)	(0.0044)	(0.0401)	(0.0086)

Table 2.3, panel A shows results from the 3FF. Both the winner and loser portfolios yield positive returns, although those returns vary across analyses. The loser portfolio always shows positive alphas but these insignificant at the 5% level in all the combination strategies. In some cases, the loser portfolio is significant at the 10% level, for longer observation and holding periods. This indicates that loser stocks carry some additional risks when they reverse. In other words, reversal of the loser portfolio is loading on risk factors such as market, size and value factors. This may indicate that, during the early stages of the reversal, irrational investors try to capture the strong reversal started by rational investors and thus push the price above its equilibrium. As irrational investors' money starts to ease, the risk diminishes at the longer observation and holding periods. On the other hand, the winner portfolio shows positive significant alphas in all of the different observation and holding period. These alphas are significant at the 5% level. This indicates that buying a past winner does not carry additional risks. Table 2.3, panel B shows results using the five-factor model of Fama and French, in which they include two additional factors: profitability and the investment factor. The loser portfolio has positive insignificant alphas at the 5% level except in one strategy, the 12 on 12. There are multiple strategies where the loser portfolio produces positive significant alphas at the 10% level. The results confirm that the reversal of the loser portfolio carries additional risks. The winner portfolio, on the other hand, always has positive significant alphas at the 5% level in all the observation and holding periods, even though the five-factor model takes into consideration two additional factors. Buying past winners does not carry additional risks. Overall, regressing the winner and loser portfolios on the three- and five-factor models show how the overall alphas of the momentum returns are generated. Given that the loser portfolio is always insignificant, it overshadows the significance of winner's alphas and thus the overall momentum strategy always has a positive alpha but it is insignificant. In other words, buying

past winners does not carry additional risk but shorting past losers does. For that reason, implementing a momentum strategy might generate abnormal returns, but these returns are associated by additional risk-taking on the shorting side.

2.5.2 Investor sentiment

The second research question regards whether investor sentiment affects future returns. This analysis implements the methodology of Baker and Wurgler (2006), where they introduce an index that measures investor sentiment. Their index is based on six different variables that they believe are good proxies for investor sentiment.[11] The sentiment index is obtained from the Baker and Wurgler website.[12] The use of the investor sentiment index follows the methodology of Antoniou et al. (2013) where they create a weighted rolling average for sentiment. In a given month t, sentiment is calculated as the weighted average of the past J months. The most recent month $J-1$ has the highest weight, $J-2$ has the second-highest weight, and $J-n$ has the lowest weight, where n is the first month in J. A period is considered optimistic (pessimistic) when the weighted average is in the top (bottom) 30% of the rolling average in the time series.

2.5.2.1 Optimistic period

Table 2.4 shows momentum returns during optimistic period. Momentum returns during optimistic periods are much higher than momentum returns than when investor sentiment is not controlled for (table 2.1). The lowest momentum returns during an optimistic period occur when $J = 9$ and $K = 12$, 0.51% average monthly returns, which is 6.34% annually. The same J and K combination without accounting for investor sentiment (table 2.1) generates 0.02% average monthly returns. The highest momentum exhibited during an optimistic period comes when $J = 12$ and $K = 3$, at 1.82% average monthly returns, which is much larger than momentum returns for same combination of formation and holding periods in table 2.1, at 0.31% average monthly return. Overall, during an optimistic period, all the J and K combinations yield positive momentum returns. This result is consistent with the findings of Antoniou et al. (2013). The winner portfolio shows strong continuation that decreases over the holding period. However, only when $J = 3$ is there increasing continuation that reverses at 6 months, which indicates that investors are willing to buy previous winners for up to 9 months.

[11] Variables are closed end fund discount, NYSE shares turnover, number and average first day returns on IPOs, equity share in new issues and dividend premium.

[12] http://people.stern.nyu.edu/jwurgler/

After nine months that they are less inclined to do so. The first 6 months of $J = 3$ are the early cycles of the underreaction. As the 6-month mark hits, underreaction starts to fade. This is more observable for the other momentum strategy combinations. The loser portfolio shows some continuation in shorter periods and reversal in longer periods. This indicates that the loser portfolio is in the late stage of the cycle of underreaction even in the shortest holding and observation periods $J = 3$ and $K = 3$. This indicates that extreme losers become very underpriced quickly, which in turn encourages rational investors to buy them back. This would make the losing stock reverse in very short period of time, i.e. when $J = 3$ and $K = 3$.

Table 2.4
Momentum and investor sentiment

Investor sentiment is formed following Antoniou et al. (2013) using a weighted rolling average for sentiment index. A period is optimistic (pessimistic) when the weighted average is in the top (bottom) 30% of the rolling average in the time series. Cross sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over *J* months in ascending order, and split into 10 equally weighted portfolios, where P10 is the winner portfolio and P1 is the loser portfolio. P10 is bought and P1 is sold. Average monthly returns are presented in this table. The sample period is January 1990 to December 2018.

Optimistic						**Pessimistic**					
J	***K***	3	6	9	12	***J***	***K***	3	6	9	12
3	L	-0.0025	-0.0019	-0.0016	-0.0002	**3**	L	0.0221	0.0227	0.0229	0.0238
	W	0.0068	0.0076	0.0075	0.0066		W	0.0199	0.0196	0.0196	0.0189
	W-L	0.93%	0.96%	0.90%	0.68%		W-L	-0.22%	-0.31%	-0.33%	-0.49%
	Ann	11.77%	12.08%	11.39%	8.41%		Ann	-2.58%	-3.64%	-3.90%	-5.70%
6	L	-0.0015	-0.0005	0.0015	0.0034	**6**	L	0.0198	0.0207	0.022	0.0229
	W	0.0142	0.0142	0.0128	0.0117		W	0.0215	0.0206	0.0192	0.0182
	W-L	1.58%	1.47%	1.12%	0.83%		W-L	0.17%	-0.01%	-0.28%	-0.47%
	Ann	20.68%	19.13%	14.36%	10.45%		Ann	2.03%	-0.18%	-3.35%	-5.52%
9	L	-0.0002	0.0021	0.0045	0.0067	**9**	L	0.0163	0.0183	0.0201	0.0208
	W	0.0166	0.0151	0.0136	0.0119		W	0.0222	0.0199	0.0181	0.0174
	W-L	1.68%	1.31%	0.91%	0.51%		W-L	0.59%	0.16%	-0.20%	-0.34%
	Ann	22.07%	16.84%	11.45%	6.34%		Ann	7.25%	1.91%	-2.37%	-3.95%
12	L	-0.0042	-0.0019	0.0006	0.0028	**12**	L	0.0164	0.0177	0.0183	0.0187
	W	0.0141	0.0128	0.011	0.0092		W	0.0209	0.0191	0.0183	0.018
	W-L	1.82%	1.47%	1.04%	0.64%		W-L	0.45%	0.13%	0.00%	-0.07%
	Ann	24.24%	19.17%	13.23%	7.97%		Ann	5.48%	1.62%	0.01%	-0.79%

Loser returns are consistent with Baker and Wurgler (2006) in which they show that during high (low) sentiment periods, small stocks, young stocks, high-volatility stocks, unprofitable stocks, non-dividend paying stocks, extreme growth stocks, and distressed stocks earn low (high) returns. All these characteristics are consistent with losing stocks. During the optimistic

period, not only do losing stocks have low (negative) returns but also continue to do so in the near future.

During optimistic and pessimistic periods, investors develop cognitive dissonance in which they act in a timely manner to new information if the information is in sync with the current sentiment, and they have delayed reaction when the new information is contrary to current sentiment. In this case, during optimistic periods the winner portfolio continues to win as investors continue buying it, since it is in sync with the market sentiment. Loser portfolios, on the other hand, show a delayed reaction during optimistic periods as they continue to lose at a decreasing rate. Overall, during the optimistic period, momentum returns are driven by both continuation of the loser portfolio and continuation of the winner portfolio, which make the overall momentum returns very high. This is also consistent with the findings of Antoniou et al. (2013) in which they find that momentum is high and significant during the period between 1967 and 2008. However, in Jegadeesh and Titman (1993) all of the losing portfolios show positive returns. These results add to the literature that momentum returns indeed continue to 2018, which both previous studies did not tackle.[13] Results also support the hypothesis that the effect of investor sentiment on momentum returns is still large after the 1990s.

2.5.2.2 Pessimistic period

Momentum returns are mixed during pessimistic periods, though returns do still exist. In fact, in some combinations of the momentum strategy, momentum returns are higher than the general momentum strategy when investor sentiment is not controlled for (table 2.1). Overall, results contradict the findings of Antoniou et al. (2013) in which they show that momentum returns are only present during optimistic periods. Results show that momentum returns are negative during shorter observation and holding periods but are positive when observing and holding stocks for longer. The winner portfolio during the optimistic period shows continuation that declines with the holding period, indicating that the winner portfolio has a shorter underreaction cycle and that the underreaction effect fades as quickly as 3 months. The loser portfolio on the other hand shows strong reversal. This reversal increases with the holding period. This is explained by the theory of Antoniou et al. (2013) that when the news is in sync with the current sentiment (loser stocks during pessimistic period), investors are quick to react. In the case of the loser portfolio, investors act very quickly and drive the loser price away from its equilibrium to a point where it turns into an opportunity for investors to buy. During

[13] Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017)

pessimistic periods, the winner portfolio takes longer to reflect new information, while the loser portfolio sees reaction in a timely manner. This is observable when the loser portfolio shows positive returns (reversal), meaning that investors have already acted upon the bad information in a way that pushes the stock price away from equilibrium, making it due for a reversal. Overall, momentum returns in a pessimistic period are driven by strong reversal in the loser portfolio that results in negative momentum in some cases. When the reversal is not as strong as the continuation of the winner portfolio, there is positive momentum. This analysis adds to the literature finding that since the 1990s, momentum returns during pessimistic periods are not always negative, as Antoniou et al. (2013) predicted.

2.5.3 Robustness checks

More analysis is conducted to assess the robustness of the results. The first analysis tests the momentum strategy during subperiods, showing whether momentum is sensitive to different market states and periods. Moreover, a regression analysis of momentum returns on the three- and five-factor model reveals whether these returns are driven by additional risk-taking by investors. A persistence analysis is also implemented to see whether momentum returns persist in the future.

2.5.3.1 Subperiods

During the period from January 1990 to December 2018, the stock market went through a lot of high and low periods. The dotcom bubble of 2000 and the 2008 stock market crash make the period unique. Robustness checks test the momentum strategy during 3 subperiods: January 1990 to December 1999, January 2000 to December 2009 and January 2010 to December 2018. Analyzing momentum returns during subperiods tests the hypothesis of whether momentum is robust to subperiod choice and addresses the theory of Hwang and Rubesam (2015), in which they argue that 50% of momentum returns are attributed to bubbles. These subperiods show multiple crashes and bubbles and one period in between. Momentum results separated by period will show whether momentum returns are indeed driven by bubbles.

2.5.3.1.1 Subperiod 1 (January 1990–December 1999)

During the period from January 1990 to December 1999, the stock market experienced high volatility building up to the dotcom bubble of 2000. Analyzing the subperiods also helps address the findings of Hwang and Rubesam (2015), which conclude that 50% of momentum returns are driven by bubbles. During this period, momentum shows positive returns for almost

all combinations of observation and holding periods in table 2.5. In fact, only two out of the 16 combinations show negative returns: $J = 3$ and $K = 3$, and $J = 12$ and $K = 12$. These findings are consistent with the conventional momentum strategy of Jegadeesh and Titman (1993), where momentum starts small in shorter periods, peaks in the middle, usually at 6 months, and then disappears after one year.

Table 2.5
Momentum returns (1990–2000)

Cross-sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over *J* months in ascending order, and split into 10 equally weighted portfolios, where P10 is the winner portfolio and P1 is the loser portfolio. P10 is bought and P1 is sold. Average monthly returns are presented in this table. The sample period is January 1990 to December 1999.

J	***K***	3	6	9	12
3	L	0.0135	0.0125	0.0118	0.0127
	W	0.013	0.0145	0.0156	0.015
	W-L	-0.05%	0.21%	0.38%	0.23%
	Ann	-0.56%	2.52%	4.60%	2.77%
6	L	0.0119	0.011	0.0116	0.0132
	W	0.0157	0.0171	0.0167	0.0153
	W-L	0.38%	0.61%	0.51%	0.21%
	Ann	4.64%	7.53%	6.31%	2.57%
9	L	0.0106	0.0113	0.0128	0.0145
	W	0.0181	0.0176	0.0163	0.0149
	W-L	0.75%	0.63%	0.35%	0.04%
	Ann	9.32%	7.78%	4.25%	0.46%
12	L	0.0122	0.0135	0.0147	0.0158
	W	0.0172	0.0163	0.0151	0.014
	W-L	0.50%	0.28%	0.04%	-0.18%
	Ann	6.18%	3.43%	0.47%	-2.12%

The loser portfolio during this period shows strong quick reversal. Reversal is observable as early as three months and it shows an increasing reversal pattern. The loser portfolio is way ahead of the underreaction phase and into overreaction. In other words, investors sold these stocks during the observation period to a point where they are away from their equilibrium price. When investors start buying these stocks back, the reversal is observable. Again, this reversal is also present in the conventional strategy of Jegadeesh and Titman (1993). The winner portfolio, on the other hand, shows the opposite pattern. While there is continuation, this continuation declines over the holding period. The decline indicates that the underreaction fades as fewer and fewer investors buy these stocks. Overall, the strong initial continuation in

the winning stocks overrides the reversal of the losing stocks, so there are positive momentum returns during the January 1990 to December 1999 period.

Table 2.6
Fama and French factor models (1990–2000)

This table shows alphas and the p-value on the alphas from a regression of momentum portfolio returns on the three-factor model of Fama and French (1993) and five-factor model of Fama and French (2016), which include RM-Rf (The market premium factor), SMB (the size factor), and HML (the value factor) (three factor) and additionally RMW (The proftability factor) and CMA (The investment factor) (five factor). The analyzed period is between Jan 1990 to Dec 1999.

	Three-factor model					**Five-factor model**				
J	***K***	3	6	9	12	***K***	3	6	9	12
3	α	-0.003	0.0033	-0.0005	-0.0004	α	-0.0029	0.0025	-0.0002	-0.0005
	P-value	(0.262)	(0.4644)	(0.849)	(0.8368)	P-value	(0.2775)	(0.5908)	(0.9214)	(0.8165)
6	α	0.0018	0.0038	0.0028	-0.0002	α	0.002	0.0039	0.0027	-0.0003
	P-value	(0.5938)	(0.1849)	(0.306)	(0.9445)	P-value	(0.5625)	(0.1932)	(0.3458)	(0.9151)
9	α	0.0054	0.0042	0.0014	-0.0017	α	0.0052	0.0041	0.0013	-0.0018
	P-value	(0.1046)	(0.1973)	(0.6581)	(0.5995)	P-value	(0.1257)	(0.2287)	(0.7037)	(0.5904)
12	α	0.0033	0.0011	-0.0015	-0.0036	α	0.0033	0.001	-0.0014	-0.0037
	P-value	(0.3681)	(0.7657)	(0.6836)	(0.2932)	P-value	(0.3914)	(0.7851)	(0.685)	(0.3051)

To assess whether momentum returns are driven by risk factors, table 2.6 shows results from regressing momentum returns on the Fama and French three- and five-factor models from January 1990 to December 1999. During this period, momentum returns do not produce significant alphas in any of the 16 different observation and holding periods for either the three- or five-factor model. The same results persist when regressing on both the three and the five-factor model. This indicates that momentum returns during the January 1990 to December 1999 period are driven by risk factors. This result is in sync with the findings of Hwang and Rubesam (2015) that momentum returns are driven by bubbles. Based on the results for this period, momentum returns during this period are driven by bubbles and come with the associated risk.

2.5.3.1.2 Subperiod 2 (January 2000–December 2009)

During the January 2000 to December 2009 period, specifically in 2008, the US stock market witnessed one of its worst crashes ever. This period could be classified as a recession period. Table 2.7 reports the results of momentum returns during this period. Despite having the crash of 2008, momentum shows strong returns in all the different strategies except when observation period is 12 months.

Table 2.7
Momentum returns (2000–2010)

Cross-sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over *J* months in ascending order, and split into 10 equally weighted portfolios, where P10 is the winner portfolio and P1 is the loser portfolio. P10 is bought and P1 is sold. Average monthly returns are presented in this table. The sample period is January 2000 to December 2009.

J	***K***	3	6	9	12
3	L	0.0038	0.004	0.0052	0.0062
	W	0.0073	0.0077	0.007	0.0065
	W-L	0.35%	0.37%	0.19%	0.02%
	Ann	4.27%	4.54%	2.24%	0.27%
6	L	0.0031	0.0044	0.006	0.007
	W	0.0089	0.0081	0.007	0.0062
	W-L	0.59%	0.37%	0.09%	-0.08%
	Ann	7.28%	4.49%	1.12%	-1.01%
9	L	0.005	0.0064	0.0078	0.0086
	W	0.0081	0.0067	0.0056	0.005
	W-L	0.32%	0.03%	-0.22%	-0.37%
	Ann	3.85%	0.33%	-2.56%	-4.30%
12	L	0.0071	0.0081	0.0093	0.0099
	W	0.0062	0.0053	0.0044	0.0042
	W-L	-0.09%	-0.29%	-0.48%	-0.57%
	Ann	-1.09%	-3.39%	-5.66%	-6.61%

The winner portfolio shows positive continuation during these periods. Investors continue to buy winner stocks. However, this buying pressure eases as the holding period is increased. The loser portfolio, on the other hand, reverses and the reversal increase as the holding period increases. Despite the 2008 crash, the behaviour of the winner and loser stocks is similar to that during the January 1990 to December 1999 period. To further assess whether the returns of the momentum strategy are driven by risk factors, Table 2.8 shows results from a regression analysis of momentum returns from January 2000 to December 2009 on the on the three- and five-factor models.

During the period from January 2000 and December 2009, there was a lot of volatility in the market. This volatility is associated with a considerable amount of risk in momentum returns. When regressing momentum returns on the three- and five-factor model of Fama and French, all of the 16 different combinations for both the three- and five-factor models have negative alphas. Some of these negative alphas are statistically significant, which indicates that the momentum strategy during this period loads heavily on the factor models. These results show

that indeed previous studies which indicated that momentum is driven by bubbles have some truth, since momentum yields significant negative alphas.

Table 2.8
Fama and French factor models (2000–2010)

This table shows alphas and the p-value on the alphas from a regression of momentum portfolio returns on the three-factor model of Fama and French (1993) and five-factor model of Fama and French (2016), which include RM-Rf (The market premium factor), SMB (the size factor), and HML (the value factor) (three factor) and additionally RMW (The proftability factor) and CMA (The investment factor) (five factor). The analyzed period is between January 2000 to December 2009.

	Three-factor model					**Five-factor model**				
J	***K***	3	6	9	12	***K***	3	6	9	12
3	α	-0.0021	-0.0018	-0.003	-0.0043	α	-0.0023	-0.0021	-0.003	-0.0043
	P-value	(0.7356)	(0.7413)	(0.4929)	(0.2153)	P-value	(0.7189)	(0.7018)	(0.5059)	(0.2317)
6	α	-0.0004	-0.0021	-0.0043	-0.0058	α	-0.0008	-0.0023	-0.0043	-0.006
	P-value	(0.9524)	(0.7275)	(0.3765)	(0.1681)	P-value	(0.9101)	(0.7173)	(0.4042)	(0.1769)
9	α	-0.003	-0.0053	-0.0074	-0.0085	α	-0.0139	-0.0052	-0.0073	-0.0085
	P-value	(0.6617)	(0.3559)	(0.1460)	(0.0606)	P-value	(0.2601)	(0.3901)	(0.1721)	(0.0727)
12	α	-0.0067	-0.0082	-0.0098	-0.0101	α	-0.0065	-0.0081	-0.0097	-0.0101
	P-value	(0.2898)	(0.1471)	(0.0552)	(0.0287)	P-value	(0.3339)	(0.1740)	(0.0717)	(0.0387)

2.5.3.1.3 Subperiod 3 (January 2010–December 2018)

During this period, there was a recovery from the 2008 crash and the market exceeded its highest point before the 2008 crash. This could be classified as an expansion period. Overall, the momentum strategy shows strong returns in all of the 16 different J and K combinations in table 2.9. The same pattern is observable for the winner and loser portfolios. The winner portfolio continues to win regardless of the observation and holding periods, and the loser portfolio reverses. This behaviour of the winner and loser portfolios is consistent with the overall momentum behaviour of Jegadeesh and Titman (1993). Momentum returns start small when the observation and holding periods are short, peak in the middle, and decrease when holding the strategy for 12 months.

Table 2.9
Momentum returns (2010–2018)

Cross-sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over *J* months in ascending order and split into 10 equally weighted portfolios, where P10 is the winner portfolio and P1 is the loser portfolio. P10 is bought and P1 is sold. Average monthly returns are presented in this table. The sample period is January 2010 to December 2018.

K	3	6	9	12
L	0.0039	0.0044	0.004	0.0044
W	0.0073	0.0067	0.0076	0.0074
W-L	0.34%	0.23%	0.36%	0.30%
Ann	4.22%	2.84%	4.40%	3.67%
L	0.004	0.0036	0.0036	0.0041
W	0.0077	0.008	0.0081	0.0078
W-L	0.38%	0.44%	0.44%	0.37%
Ann	4.60%	5.39%	5.43%	4.52%
L	0.0027	0.0032	0.0034	0.0037
W	0.0089	0.0085	0.0083	0.0082
W-L	0.62%	0.53%	0.49%	0.45%
Ann	7.66%	6.57%	6.01%	5.49%
L	0.003	0.0035	0.0035	0.0038
W	0.0087	0.0084	0.0085	0.0083
W-L	0.56%	0.49%	0.50%	0.45%
Ann	6.96%	6.00%	6.14%	5.51%

To further asses the source of momentum returns, table 2.10 shows results from regressing momentum returns on the Fama and French factors. Table 2.10 produces results that are very different from analysis for the previous two subperiods. During the January 2010 to December 2018 period, momentum returns show positive alphas for all of the different observation and holding period combinations, for both the three- and five-factor models. More importantly, these positive alphas are statistically significant for most of the strategy combinations. Positive significant alphas indicate that the source of momentum profits is still an open discussion, since risk-based models cannot explain returns in this latter period after managed funds have been able to implement momentum strategies. For further context on the relationship between momentum and risk factors, table 2.11 shows loading factors. This result opens the door for behavioural explanations and risk explanations that are not addressed by the three- and five-factor model.

Table 2.10
Fama and French factor models (2010–2018)

This table shows alphas and the p-value on the alphas from a regression of momentum portfolio returns on the three-factor model of Fama and French (1993) and five-factor model of Fama and French (2016), which include RM-Rf (The market premium factor), SMB (the size factor), and HML (the value factor) (three factor) and additionally RMW (The profitability factor) and CMA (The investment factor) (five factor). The analyzed period is between January 2010 to December 2018.

	Three-factor model					**Five-factor model**				
J	***K***	3	6	9	12	***K***	3	6	9	12
3	α	0.0024	0.0022	0.0022	0.003	α	0.0031	0.003	0.003	0.0035
	P-value	(0.3652)	(0.3114)	(0.3114)	(0.0574)	P-value	(0.2403)	(0.1594)	(0.1594)	(0.0274)
6	α	0.0031	0.0043	0.0046	0.0041	α	0.0044	0.0054	0.0055	0.0048
	P-value	(0.2821)	(0.1046)	(0.0510)	(0.0471)	P-value	(0.1252)	(0.0369)	(0.0198)	(0.0206)
9	α	0.0058	0.0055	0.0054	0.0052	α	0.0071	0.0066	0.0062	0.0058
	P-value	(0.0570)	(0.0548)	(0.0392)	(0.0257)	P-value	(0.0194)	(0.0213)	(0.0172)	(0.0133)
12	α	0.0058	0.0054	0.0058	0.0054	α	0.0069	0.0064	0.0065	0.0058
	P-value	(0.0593)	(0.0590)	(0.0287)	(0.0286)	P-value	(0.0235)	(0.0258)	(0.0150)	(0.0195)

Table 2.11
Loading factors of momentum returns

A sample of the regression analysis of the 9 on 3 strategy that shows how momentum returns load on the risk factors. This is for the period January 2010 to December 2018.

Panel A: three-factor model				
	Coefficients	SE	t Stat	P-value
Intercept	0.0097	0.0027	(3.5366)	(0.0005)
Mkt-RF	0.1707	0.0666	(2.5634)	(0.0108)
SMB	0.0916	0.0911	(1.0048)	(0.3157)
HML	-0.0501	0.0929	(-0.5393)	(0.5901)
Panel B: five-factor model				
	Coefficients	SE	t Stat	P-value
Intercept	0.0108	0.0028	(3.7995)	(0.0002)
Mkt-RF	0.1261	0.0761	(1.6571)	(0.0984)
SMB	0.0218	0.1005	(0.2169)	(0.8284)
HML	0.023	0.1313	(0.1750)	(0.8612)
RMW	-0.2223	0.1328	(-1.6741)	(0.0950)
CMA	-0.041	0.189	(-0.2169)	(0.8284)

In table 2.11, panel A, regression of momentum returns on the three-factor model produces a positive alpha (0.0097) that is significant at the 5% level. Momentum returns load only on the market factor with significance. While momentum loads positively on the size factor and

negatively on value factor, both are insignificant. Regression results show that momentum returns during the January 2010 to December 2018 period are not associated with additional risk taking or driven by small stocks.[14] In table 2.11, panel B, regression of momentum returns on the five-factor model produce a positive alpha (0.0108) that is significant at the 5% level. Similar to the results from the three-factor model, momentum returns load significantly on the market factor. They also load positively on the size and value factors but with no significance. However, momentum returns load negatively and significantly on the profitability factor. This indicates that momentum do not carry additional risk other than those tested by the three and the five factor models of Fama and French (1993, 2016).

2.5.3.2 Summary of results

In this robustness check, three different subperiods are examined. All three subperiods show strong momentum. The loser portfolio reverses at an increasing rate and winner portfolio continues at a decreasing rate. Findings are consistent with the conventional momentum strategy of Jegadeesh and Titman (1993). This robustness check addresses the issue raised by Hwang and Rubesam (2015), showing that momentum is not based on bubbles and most importantly that momentum did not disappear after the 1990s. Indeed, momentum returns are explained by risk factors during the first (January 1990 to December 1999) and second (January 2000 to December 2009) subperiods but risk factors could not explain the most recent subperiod (January 2010 to December 2018). Such results open the door for more research on the source of momentum returns. Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017) show that momentum returns disappeared since the 1990s. They might be correct that there are some subperiods since the 1990s in which momentum returns are completely explained by risk factors, but even then, momentum produces strong results during these periods. However, the results in this study show that since the 1990s and during the period between January 2010 to December 2018 period, momentum not only showed positive returns but also produced positive significant alphas when regressed on the three- and five-factor models. Such findings open the door for more research in the subject.

2.5.4 Persistence

To better assess momentum returns during the period from January 1990 to December 2018, a persistence test is performed to see whether momentum returns continue in the future. Based

[14] Fama and French (2016)

on the findings of Jegadeesh and Titman (1993), momentum returns start small but gradually increase as the holding and observation periods increase and diminish after 12 months. This study shows that momentum returns diminish after 12 months, which is consistent with the findings of Jegadeesh and Titman 1993.

Table 2.12

The persistence of momentum profits

In each month t from January 1990 to December 2018, analysis is performed the following 12 cross-sectional regressions (for $J = 14$ to $J = 25$ to $J = 50$ to $J = 61$): $ri,t = b0jt + b1jt\ ri,t-1 + b2jt\ SIZEi,t-1 + b3jt\ JTHi,t-j + b4jt\ JTLi,t-j + \varepsilon i,t,$

Where $ri,\ t$ is the return of stock i in month t; $SIZEi,t-1$ is the natural logarithm of stock i's market capitalization at the end of previous month; $JTHi,t-j$ ($JTLi,t-j$) is a dummy variable that equals 1 if stock i's JT measure is ranked at the top (bottom) 10% at the end of month $t-j$, and zero otherwise. In each month t, the analysis estimates 12 cross-sectional regressions for $j = 14$ to $j = 25$ to $j = 50$ to $j = 61$ and average the corresponding coefficient estimates.

Variable	Return (14, 25)		Return (26, 37)		Return (38, 49)		Returns (50, 61)	
	Jan inc.	Jan exc.	Jan inc.	Jan exc.	Jan inc.	Jan exc.	Jan inc.	Jan exc.
Intercept	0.0257	0.0090	0.0264	0.0093	0.0262	0.0086	0.0257	0.0085
P-value	(0.0001)	(0.1690)	(0.0000)	(0.1426)	(0.0000)	(0.1706)	(0.0000)	(0.1722)
$\mathbf{R_{i,t-1}}$	-0.0504	-0.0410	-0.0507	-0.0412	-0.0515	-0.0420	-0.0508	-0.0412
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	-0.0012	0.0000	-0.0012	0.0000	-0.0012	0.0000	-0.0011	0.0001
P-value	(0.0059)	(0.9845)	(0.0028)	(0.9514)	(0.0031)	(0.9353)	(0.0042)	(0.8083)
JTW	-0.0015	-0.0015	-0.0003	-0.0003	-0.0003	-0.0006	-0.0015	-0.0020
P-value	(0.0280)	(0.0372)	(0.6495)	(0.6334)	(0.6560)	(0.4002)	(0.0338)	(0.0075)
JTL	0.0013	-0.0007	0.0006	-0.0008	0.0003	-0.0006	0.0012	0.0005
P-value	(0.2585)	(0.5403)	(0.6187)	(0.4829)	(0.7338)	(0.5000)	(0.0881)	(0.4689)
JTW-JTL	-0.0029	-0.0008	-0.0009	0.0005	-0.0006	0.0000	-0.0028	-0.0025
P-value	(0.0270)	(0.4766)	(0.4348)	(0.6862)	(0.4711)	(0.9934)	(0.0005)	(0.0014)

Table 2.12 shows the persistence of momentum returns up to 5 years, and also shows momentum returns with January excluded. Momentum returns both including and excluding January returns diminish after one year. In fact, they show negative significant returns. The winner portfolio shows negative returns in all of the persistence periods, and they are all significant, except in year 2 (14, 25) and in year 5 (50, 61). This indicates that momentum returns turn negative and carry a lot of risk after the first year, which is consistent with the current literature. The loser portfolio, on the other hand, shows mixed returns. Some returns are positive and some are negative. All the negative returns are insignificant, but in year 5, the loser portfolio shows positive significant returns at the 10% level. Momentum returns load negatively on the size factor up to 5 years, but this is true only when the month of January is included. When January is excluded, the loading is small and insignificant. This indicates that

the majority of the relationship between small stocks and the momentum strategy comes from the month of January.

2.5.5 Summary

This study finds that momentum returns taken as a whole from January 1990 to December 2018 are positive but insignificant. The subperiods from January 1990 to December 1999 and January 2000 to December 2009 exhibit the same thing, which indicates that the findings of Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017) are accurate. However, including the last years of data from January 2010 to December 2018 shows that momentum is large and significant. These positive returns are not explained by either the three- or five-factor models. Moreover, momentum is also present when controlling for investor sentiment. Unlike the findings of Antoniou et al. (2013), in which they find that momentum returns are only present in optimistic periods, this study finds that momentum is present in optimistic periods as well as pessimistic periods between January 1990 to December 2018. Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017) might have been correct that momentum returns have disappeared since the 1990s in terms of their exposure to risk factors.

2.6 Conclusion

This chapter asks the question of whether momentum still exists. The importance of the question is that if momentum returns disappear because investors started acting upon momentum, then in some way this pattern is driven by risk factors, which will significantly tip the scales in the favor of the risk-based explanation. In an attempt to answer this question, the momentum strategy is tested from January 1990 to December 2018. Momentum appears to be large but insignificant during the tested period. The loser portfolio reverses and the winner portfolio exhibit continuation, both of which are consistent with the original momentum findings of Jegadeesh and Titman (1993). The loser portfolio reversal shows insignificant alphas but the winner portfolio shows significant alphas. The loser portfolio reversal brings the overall return down to the point where the overall return is no longer significant. Momentum is also large during the subperiods between 1990 to 2000, 2000 to 2010, and 2010 to 2018. However, all of these are insignificant except the last decade (January 2010 to December 2018). These findings contradict the findings of Hwang and Rubesam (2015) and Bhattacharya, Li and Sonaer (2017), who find that momentum disappeared after the 1990s. Results also show

that investor sentiment affects momentum returns during both optimistic and pessimistic periods, which contradicts the findings of Antoniou et al. (2013).[15] These findings are important for two reasons. The first is that the momentum effect still exists even after decades of publications and knowledge of it among investors. Even though momentum disappeared between January 1990 and December 2009, it is present in the last decade. The argument that momentum disappeared because investors started acting upon it is not applicable to the last decade. The second reason these findings are important is that momentum returns are found in both pessimistic and optimistic periods. Taken together, these results open the door for scholars to continue the journey of finding the source of momentum returns. This chapter produce some practical implications. One, is that investors can continue, as they have been doing for the past three decades, to trade on momentum strategy as it still exists and produce abnormal returns in some periods. Even though momentum might not be as profitable as the overall market in some periods, in other periods it generates abnormal returns without bearing additional risks, as measured by the three and five factor models. As stated previously, the results from this chapter pave the way for future researchers to continue their journey on finding the source of momentum returns as momentum is still exists. There are some limitations for this chapter however, one being that the study was conducted in the US and might not be applicable elsewhere. Future research could robust such findings by looking at whether momentum still exists outside the US market.

[15] They state that momentum is only present in optimistic periods.

Chapter Three: Momentum effect and corporate governance

3.1 Introduction

The existing literature has tackled the source of momentum from a single variable perspective (Hong and Stein, 1999; Hong, Lim and Stein, 2000; Avramov et al., 2007), yet more and more variables are being introduced as the motivating factor of the momentum effect. A group of variables (or firm characteristics) is likely to motivate the momentum affect, rather than a single factor alone. This study aims to examine the effect of corporate governance, as proxied by an index that captures multiple firm-specific characteristics, on predicting a firm's future returns. Gompers, Ishii and Metrick (2003) show that companies with strong shareholder rights (as measured by the G-index) yield higher returns than companies with restricted shareholder rights[16]. Corporate governance is correlated with firm value and future returns which makes it a relevant variable in the momentum literature. Data comes from Gompers, Ishii and Metrick (2003), which runs from 1990 to 2007 and assigns to each stock a corporate governance score (G-index) from 1 to 24 indicating the number of provisions either restricting shareholder rights or increasing managerial power. The analysis focuses on stocks with a corporate governance score of 5 (or less), which are the democratic or strongest-rights companies, and on stocks with a corporate governance score of 14 (and above), which are the dictatorship or weakest-rights companies. This study addresses an important gap in the existing literature related to the EMH – that of corporate governance and momentum – by investigating the relationship between corporate governance (or shareholder rights) and investor decisions to buy/sell past winners and losers.

This study finds that corporate governance, or shareholder rights, has an impact on momentum returns. Implementing the momentum trading strategy on portfolios of stocks with different levels of shareholder rights shows that past winner and loser stocks with a dictatorship

[16] The G-index contains 24 provisions that either restrict shareholder rights or increase managerial power and, thus, measure the level of corporate governance in a company. Some provisions include anti-greenmail, blank check, golden parachutes, poison pills, confidential voting, and supermajority. For a full list of provisions see the appendix of Gompers, Ishi and Metrick (2003).

corporate governance structure (G14) exhibit significant positive excess returns during an expansionary and recessionary period, respectively. This result is consistent with the returns of winners and losers when implementing the momentum strategy across all companies with a corporate governance score. During the expansionary period, winners produce positive and significant excess returns, while during the recessionary period, losers generate positive and significant alphas. A risk factor analysis shows that investors buying up G14 winners during good times will even look at stocks with low profitability (apart from being small and highly correlated with the market index), while when they sell G14 losers at bad times they particularly choose stocks of low profitability, low investment, and high exposure with the market portfolio. As far as extreme winners and losers are concerned, G14 winners give negative and significant alphas for the expansionary period, indicating that investors are reluctant to buy extreme past winners of the G14 category, which often leads to mispricing relative to risk factor exposure.[17] Overall, investors are less (more) reluctant to sell (buy) losing (winning) stocks of weak shareholders rights (G14) compared to stocks of strong shareholders rights (G5).

The remainder of the paper is structured as follows: section 2 summarises the existing relevant literature. Section 3 explains the theoretical framework of the study and the hypotheses to be tested. Section 4 details the dataset and methodology used in the empirical analysis, while Section 5 presents the empirical results. Section 6 provides the conclusion.

3.2 Research Background

3.2.1 Momentum effects and efficient market hypothesis

The EMH is a key insight in the academic research field of finance. However, the EMH has warranted considerable criticism due to its limited applicability in the practical world and the existence of anomalies that allow investors to outperform the market (Narver and Slater, 1990;

[17] The mispricing in G14 stocks could potentially be attributed to the fact that companies with weak shareholder rights or corporate governance structure (G14) are riskier in terms of investment recovery and less transparent in terms information disclosure. Investors are more (less) reluctant to buy (sell) G14 winners (losers) when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas). Companies with weak shareholders rights or corporate governance structure might be of less interest to financial analysts, and therefore, a smaller number of them may follow these companies on a regular basis. As a result, news about weak-rights companies takes longer to disseminate and to be incorporate into current prices, pushing G14 stocks away from fundamental prices for longer periods.

Daniel and Titman, 1999; Ball, 2009). For example, market anomalies include size (Banz, 1981), share turnover (Datar, Naik and Radcliffe, 1998), lagged one-month returns (Jegadeesh, 1990), momentum (Jegadeesh and Titman, 1993), liquidity (Amihud, 2002), accounting accruals (Sloan, 1996), asset growth (Cooper, Gulen and Schill, 2008), change of shares outstanding (Pontiff and Woodgate, 2008), idiosyncratic volatility (Ang et al., 2006) and profitability (Fama and French, 2006). Using a three-factor model, Fama and French (1993) find that a significant portion of market anomalies stem from investors taking on additional risk either from the overall market (RM-RF), the returns of small companies (SMB) or the returns of value companies (HML). In other words, loading on one of these factors indicate that additional risk is taken. However, what make the momentum effect unique is that the three-factor does not explain it. Momentum profits do not rely on the overall market, small companies or value companies. De Bondt and Thaler (1985) find that with the introduction of new information, stock prices tend to overreact, which in turn increases the likelihood of stock price reversal. This overreaction is thought to be a source of contrarian profits and a legitimate challenge to the applicability of the EMH. Jegadeesh and Titman (1993) find that stock prices exhibit not only overreaction, but also underreaction in the short-term. Fama and French (1996) argue that market anomalies deemed non-existent by EMH are exploited by trading strategies that yield abnormal returns and can be explained by the Fama and French three-factor model (Fama and French, 1993). While the three-factor model can explain the long-term reversal in stock returns (contrarian), it cannot explain short-term continuation in stock returns (momentum).[18] The three-factor model is thought to be unable to explain momentum for three reasons. First, momentum is the result of data snooping. Second, asset pricing is irrational, and investors do indeed underreact to news. Third, asset pricing is rational, but the three-factor model does not have sufficient explanatory power to explain momentum profits (Fama and French, 1996). Israel and Moskowitz (2013) reject the theory that momentum is a size effect and that, after accounting for trading cost, abnormal returns disappear. Due to the lack of a

[18] The contrarian trading strategy shorts winners and buys losers in the expectation that they are due to reverse in one to two years. De Bondt and Thaler (1985) believe the cause of contrarian profits are a result of overreaction to news. Contrarian strategies benefit from overreaction, as it posits buying securities that have been declining in performance and selling securities that have been performing well. As a result, the contrarian strategy yields abnormal returns, which in turn contradicts the weak form of EMH. However, contrarian profits have been found to occur in the month of January and researchers have concluded that these abnormal returns are due to a seasonality effect (Yao, 2012) or herding behaviour (Chen, Hua and Jiang, 2018). Thus, the source of contrarian profits is initially believed to be driven by behavioural biases and overreaction to news (De Bondt and Thaler, 1985; Barberis et al., 1998; Daniel, Hirshleifer, and Subrahmanyam, 1997). Other scholars have questioned the source of momentum from contrarian strategies. They argue that behavioural models are difficult to classify and a logical change in the methodology would make abnormal return disappear (Fama and French, 1996).

testable framework, researchers believe that behavioural theories are not sufficient to explain momentum (Fama and French, 1993, 1996, 2012, 2015, 2016; Fama, 1998). On the other hand, opposition to behavioural theories asserts that that, since momentum can be dependent on risk factors, abnormal returns are a compensation for additional risk taking (Avramov et al., 2007).

3.2.1.1 Sources of momentum profits

Momentum refers to a pattern in the market where prices that have been moving in one direction will continue to do so in the short-term (Jegadeesh and Titman, 1993). A momentum trading strategy takes advantage of momentum by buying (long) previous winners, selling (short) previous losers, and holding that portfolio for a period of time – generally 6 months. Researchers have tested the momentum strategy and found that shorter holding periods (weekly) could generate abnormal returns (Demir, Muthuswamy and Walter, 2004; Gutierrez and Kelley, 2008). Abnormal returns observed from compliance with a momentum trading strategy are referred to as momentum profits. Jegadeesh and Titman show that a momentum trading strategy yields 1% return per month and the returns of the momentum strategy cannot be explained by systematic risk factors or the reaction of price to common factors. In a recent study, Fama and French (2016) introduce a new model for asset pricing where two new factors are added to the three-factor model. They include a profitability factor and an investment factor. However, this five-factor model could not explain momentum in small firms. While many scholars have attempted to explain the source of momentum, there has been no general consensus. Momentum may have a relationship with firm size. Using the model from Banz (1981), studies have shown that, while momentum has a negative relation with size, it does appear in mid- to large-size firms (Rouwenhorst, 1998; Fama and French, 2012). Other studies have shown that even after controlling for firm-specific characteristics, the momentum effect appears to be significant (Lui, Strong and Xu, 1999). Other proposed determinants of momentum profits are macroeconomic risk factors (Griffin, Ji and Martin, 2003) and country-level individualism (Chui, Titman and Wei, 2010). There is evidence that industry momentum accounts for much of the profits generated by the traditional momentum strategy (Moskowitz and Grinblatt, 1999). They show that a momentum strategy based in specific industries would not yield significant returns. However, a momentum strategy that is based on buying and selling would be more profitable than the strategies pursued in Jegadeesh and Titman (1993). Moskowitz and Grinblatt also show that traditional momentum strategy profits are driven by industry momentum and is found to be significant even in large and liquid companies.

Other scholars have taken a different approach as they believe momentum profits could be related to firm-specific factors. Sagi and Seasholes (2007) find that companies with high revenue growth volatility, low costs, and valuable growth options outperform the results of the traditional momentum strategy by 5% per year. Other sets of firm-specific attributes like firm size, poor performance and higher trading costs are also associated with momentum profits (Lesmond, Schill and Zhou, 2004). One firm-specific attribution that has generated a lot of attention is a company's credit rating. Avramov et al. (2007) find that firms with low credit ratings have a positive relationship with momentum after controlling for return distribution, overall momentum profits, industry momentum, size, and risk factors. Low credit rating firms tend to take greater risk, and thus momentum profits arise from a reaction to information regarding a company's operating performance. These companies also tend to have higher return volatility and high analyst dispersion, which is common, given their operating risk. The findings of the study could be interpreted as momentum being based on risk factors and not on behavioural ones.

3.2.2 Underreaction and analyst coverage

Hong and Stein (1999) hypothesize, given that underreaction is the main source of momentum, that information diffusion should significantly affect momentum profits. They find that when information diffuses gradually (measured by size and analyst coverage), underreaction appears to be significant (Hong, Lim and Stein, 2000).[19] Even though size is used in their study, they believe a different proxy would be more appropriate. Other scholars have used options implied volatility to measure information diffusion and found that momentum is based on securities with low information diffusion rather than the most volatile ones (Chen and Lu, 2017). Momentum is affected not only by the gradual diffusion of information, but also by the increasing rate of information diffusion (Andrei and Cujean, 2017). This is in support of other research that points similarly to the role of information diffusion and pace as the source of

[19] Hong and Stein (1999) documented that information diffusion could be the driver of momentum profits and that the amount of analyst coverage is an appropriate proxy. Thus, it is important to see how analyst coverage affects prices and the overall market. As shown by Hong, Lim and Stein (2000), momentum is higher among companies that have lower analyst coverage compared to companies with high analyst coverage. They believe analysts neglect poorly performing small companies and, thus, information on these companies would spread gradually and make momentum profits greater. Further, studies have found that companies with more transparency and that file voluntary filings are followed by more analysts. These companies attract more analysts because information regarding company governance is readily available and does not require significant time commitments. These findings disagree with the intuition that increased transparency would mean that investors will receive company information directly from the company (Lang and Lundholm, 1996). They conclude that benefits of disclosure would reduce information asymmetry and reduce a company's cost of capital.

momentum trading (Hong and Stein, 1999; Hong, Lim and Stein, 2000). The findings of Hong and Stein (1999) and Hong, Lim and Stein (2000) imply that information diffusion may account for the momentum phenomena, which is an attempt to capitalise on market inefficiency. Analyst coverage is therefore an important consideration of research as it is directly related to information diffusion. Scholars posit that analyst coverage affects financial markets (Barth and Hutton, 2001; Healy and Palepu, 2001) and stock prices (Givoly and Lakonishok, 1980), and helps disseminate information quickly in the market. In effect, analysts serve to act as a monitoring tool in the market (Bushman and Smith, 2001; Healy and Palepu, 2001).[20] Exploring how analyst coverage could be driven by different firm-specific characteristics may lead us to a new variable that would explain the momentum effect.

3.2.3 Corporate governance, analyst coverage and momentum profits

It has been established that companies with more voluntary disclosure are followed by more analysts. These analysts help disseminate information more quickly. Additionally, other studies show that companies with good corporate governance structure are followed by more analysts (Chou and Shiah-Hou, 2010) and that better-governed firms do make more informative disclosures (Beekes and Brown, 2006). Thus, the working theory in this paper is that the cycle of the momentum effect is as follows: companies with a corporate governance structure in place have a higher tendency for voluntary disclosure. Voluntary disclosures draw more attention from analysts and so more analysts follow the company. The higher number of analysts helps incorporate information into the stock price which makes the stock price more efficient and reduces the momentum effect. In other words, information disclosure attracts more analyst coverage. Therefore, it follows that firms that divulge information receive more analyst coverage (Lang and Lundholm, 1996). One of the main factors that influences the extent of analyst coverage is whether firms follow a good code of corporate governance.[21] High

[20] In particular, analysts have a positive impact on market efficiency. Healy and Palepu (2001) suggest that analyst coverage enhances market efficiency and that stock prices with high analyst coverage incorporate information more quickly (Barth and Hutton, 2001).

[21] There are multiple corporate governance measurements in the current literature. The framework of Gompers, Ishii and Metrick (2003) is the most appropriate framework as a proxy for corporate governance levels. They use 24 different provisions to measure the level of corporate governance in a company. Provisions are split into five categories (Delay, Protection, Voting, State and Other). An equally weighted index (G-index) is constructed based on these 24 variables. Companies with high G-index score of 14 (or more) are considered dictatorship companies or companies with weak shareholder rights. Companies with a low G-index score of 5 (or less) are considered democracy companies, or companies with strong shareholders rights. They devise a trading strategy that buys companies with high corporate governance (low G-index) and sell companies with low corporate governance (high G-index). Their strategy yields an abnormal return of 8.5% annually. Companies with strong shareholder

corporate governance companies have more analyst coverage (Chou and Shiah-Hou, 2010). Good corporate governance also serves to enhance market liquidity and decrease information-based trading (as with momentum trading) (Chung, Elder and Kim, 2010). And so, the research proposed in this paper operates on the theoretical premise of Hong and Stein (1999) and Hong, Lim and Stein (2000) to further test their hypothesis by accounting for the role of corporate governance in momentum profits. Studies have shown that buying companies with strong corporate governance and shorting companies with weak corporate governance can yield 8.5% returns (Gompers, Ishii and Metrick, 2003). This forms the basis of the quantitative analysis carried out in this study. Corporate governance affects profitability of momentum strategies by reducing information asymmetry (Hong, Lim and Stein, 2000; Derrien and Kecskés, 2013), increasing information disclosure (Lang and Lundholm, 1996; Bushman and Smith, 2001; Healy and Palepu, 2001) and influencing the informational efficiency of stock prices (Boehmer and Kelley, 2009). Corporate governance also affects market efficiency by minimizing insider abnormal profits (Cai, Keasey and Short, 2006). On the other hand, positive abnormal returns are also associated with large firms that are not completely compliant with rules of corporate governance (US stock exchange regulations), which has a significant impact on firm value (Vidhi and Yaniv, 2007). This implies that companies that are not in compliance with rules of corporate governance are less informationally efficient in respect to their security prices.

Companies with corporate governance structure have high information diffusion, and thereby, followed by more analysts. This offers an alternative explanation to anomalies in the market. Since momentum is based on underreaction to news, companies could minimise the momentum effect by implementing a code of corporate governance. It is also important to note that researchers have shown firms with strong corporate governance have higher credit ratings (Ashbaugh-Skaife, Collins and LaFond, 2006; Weber, 2006). This is not trivial as momentum profits have also been shown to be explained by a firm's credit rating (Avramov et al., 2007).

rights (low G-index score) have a significant positive alpha when regressed on the four-factor model of Carhart (1997). Companies with weak shareholder rights (high G-index) yielded significant negative alphas.

3.3 Research question and hypotheses

3.3.1 Research question

As previously discussed, there is a positive relationship between corporate governance and market efficiency. A greater focus on corporate governance contributes to a higher likelihood that asset prices would fully reflect all available information. Similarly, previous literature also confirms the existence of a positive relationship between corporate governance and information diffusion (Kanagaretnam, Lobo and Whalen, 2007; Chou and Shiah-Hou, 2010). On the other hand, market efficiency (based on EMH) is found to have a negative relationship with momentum returns because increased efficiency in financial markets would make it difficult for investors to benefit from a momentum trading strategy. Another interesting question is whether companies with different shareholder rights also have different degrees of information diffusion. For example, companies with weak shareholders rights or corporate governance structure might be of less interest to financial analysts. News about these companies takes longer to disseminate and to be incorporated into current prices, pushing stocks with weak shareholder rights away from fundamental prices for longer times. On the other hand, corporate governance is likely to have an impact on the investors decision to buy winners and sell losers, which means that a more robust corporate governance would reduce the likelihood that investors could earn abnormal returns. Companies with weak shareholder rights or corporate governance structure (G14) are possibly riskier in terms of investment recovery and less transparent in terms of information disclosure. Thus, investors might be more (less) reluctant to buy (sell) G14 winners (losers) when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas).

This study attempts to examine market momentum returns (for all stocks with a corporate governance score) and whether or not these returns are explained by the commonly known risk factors such as market, size, value, profitability, and investment. The relationship between corporate governance scores and momentum returns can be found by looking at winner/loser portfolio return continuations and reversals for stocks with strong (G5) and weak (G14) shareholder rights. Given the existing empirical evidence that momentum returns are more pronounced during expansionary periods compared to recessionary ones, it also examines the winner and loser portfolio returns during both expansionary and recessionary periods. The relevant research questions are:

1. Do momentum strategies yield positive/negative and significant excess returns across expansionary and recessionary periods?
2. Do momentum strategies yield positive/negative and significant excess returns when they are applied separately on stocks with weak (G14) and strong (G5) shareholder rights?
3. Are stocks with weak shareholder rights (G14) far more often mispriced compared to stocks of strong shareholder rights (G5)?
4. Do shareholder rights (weak or strong) affect the investor decision to buy/sell extreme past winners and losers?

3.3.2 Hypothesis

To answer the above question, the following hypotheses are proposed:

H_1: momentum returns have a positive relationship with market state.

H_2: momentum returns have a negative relationship with firms' corporate governance.

H_3: firms' corporate governance has a positive relationship with their stock price efficiency.

H_4: firms' corporate governance has a positive relationship with investor willingness to buy and sell their extreme stocks.

3.4 Data and methodology

3.4.1 Data

Data on corporate governance for US companies is based on the Gompers, Ishii and Metrick (2003) dataset, between the years of 1990 and 2007. The governance score is based on 24 different provisions that either restrict shareholder rights or increase managerial power (see appendix), and so measures the level of corporate governace in a given company. The G-index variable is constructed as an equally weighted index based on the 24 different provisions. Given that all variables have a negative sentiment to them, a high G-index score indicates that a company is categorised to have a dictatorship stucture. A company with a low G-index score indicate that it is categorised to have a democracy structure.

Monthly stock return data (RET) is collected from from CRSP for all the companies with a G-index score in Gompers, Ishii and Metrick (2003). Due to the limitations on the G-index data, the study is limited to match the time period of the governance score data. Gompers, Ishii and Metrick (2003) provide data for a set of companies every two years. Companies in the dataset

may be dropped out of the dataset or added back whenever the G-index score is updated. While Jegadeesh and Titman remove stocks that are in the lowest NYSE decile and stocks below the $5 mark, this study does not further limit the data set in this way, since it is already limited to stocks that have a G-index score.

3.4.2 Methodology

Momentum portfolio creation follows Jegadeesh and Titman (1993). The momentum strategy uses an overlapping portfolio, whereby at any given month t, the strategy holds a series of portfolios that have been selected in the current month and portfolios in $K-1$ months (K holding periods). Returns are observed from time t to $t-J$ (J observation periods). At a given month t, all companies are ranked based on their previous returns. Five and ten portfolios are formed based on quantiles (deciles), where P10 is the top 20% (10%) of all companies ranked based on their average past returns and P5 (P1) is the lowest 20% (10%) of all companies ranked based on the same metric. The momentum strategy observes stocks for 3, 6, 9 or 12 months before selecting them, and then holds for 3, 6, 9 or 12 months, resulting in a total of 16 different strategies. The same strategy is repeated each month to create overlapping portfolios. The monthly momentum return is the equally weighted return across all the montly overlapping portfolios.

To examine whether the level of corporate governance affects investor decisions to buy winners and sell losers, the momentum strategy is modified based on the G-index score. First, all companies are ranked based on their corporate governance score. Then, the momentum strategy is run separately for those with a governance score of 14 and above, the dictatorship or weakest-rights companies (G14), and those with a score of 5 and below, democratic, or strongest-rights companies (G5). At time t stocks are observed for the previous J months, G14 and G5 stocks are ranked based on the average past return performance over the same period. Five (ten) portfolios are created, one for each quantile (decile). Stocks are assigned to portfolios, where the top quantile (decile) is called the winner portfolio and the bottom quantile (decile) is called the loser portfolio. The momentum strategy buys (long) the winner portfolio and sells (short) the loser portfolio. The same strategy is repeated at the beginning of each month t until the end of the sample window. Aggregate returns are the average returns for the periods. To investigate whether momentum portfolio returns and winner/loser portfolio returns

are explained by exposure to commonly known risk factors, returns are explained using the three- and five-factor models.

3.5 Empirical results

3.5.1 Overall period (1990–2008)

Analysis begins with overall market momentum for all companies in the dataset using a 5 and 10-portfolio partition. The analysis then investigate momentum returns based on corporate governance scores for the period from 1990 to 2008.

3.5.1.1 Market momentum

Returns for different momentum portfolios for the full set of firms within the dataset are in table 3.1. Looking at the 5-portfolio sort (panel A), momentum returns increase moving from short (3 months) to near long (9 months) observation and holding periods. For the longest holding period (12 months), momentum returns are positive (negative) for the 3/6 (9/12) month observation periods. Momentum portfolio returns peak at the 9 on 3 strategy with 4% annual return, while the lowest return (-7% annual return) is for the 12 on 12 strategy.

Winner portfolios continue to win at a decreasing (increasing) rate when switching from short- to long-term holding (observation) periods. On the other hand, the loser portfolios always reverse and produce returns that increase with the holding period. These results are consistent with the findings of Jegadeesh and Titman (1993). When momentum returns are regressed on the three- and five-factor models (see table 3.2, panel A and B), they are explained by exposure to risk factors and generate insignificant (positive or negative) alphas across all strategies (only the 12 on 12 strategy gives a negative and significant five-factor alpha at the 10% significance level). Further, the loser portfolio generates positive (or negative) insignificant three- and five-factor alphas. The winner portfolio produces positive significant alphas in 13 (9) out of 16 strategies when regressed on the three (five) factor model. The winner portfolio with the highest significant (three- and five-factor) alphas is for the 9 on 3 strategy, the same strategy that generates the highest momentum returns.

Table 3.1
Cross-sectional market momentum (overall period 1990–2008)

Cross-sectional momentum is formed based on observation period *J* months and holding period *K* months. Stocks are ranked based on their past performance over *J* months in ascending order. 5 equally weighted portfolios (panel A) and 10 equally weighted portfolios (panel B) are formed based on the past *J* months performance. P1 is the loser portfolio and P10 is the winner portfolio. Stocks with the most returns over the observation period *J* months (P10) are bought and stocks with the lowest performance over *J* months are sold (P1). The average monthly return is the difference between the winner and loser. The sample period is January 1990 to December 2007.

Panel A						**Panel B**					
Momentum 5 portfolios						**Momentum 10 portfolios**					
J	**K**	**3**	**6**	**9**	**12**	***J***	**K**	**3**	**6**	**9**	**12**
3	**Loser**	0.0149	0.0141	0.0139	0.0143	**3**	**Loser**	0.0149	0.0144	0.0148	0.0155
	Winner	0.0136	0.0143	0.0147	0.0147		**Winner**	0.0156	0.0161	0.0162	0.0159
	W-L	-0.0014	0.0002	0.0007	0.0003		**W-L**	0.0007	0.0017	0.0013	0.0004
	Annual	-1.60%	0.20%	0.90%	0.40%		**Annual**	0.90%	2.00%	1.60%	0.50%
6	**Loser**	0.014	0.0133	0.0135	0.0146	**6**	**Loser**	0.014	0.014	0.0147	0.0163
	Winner	0.0152	0.0159	0.0155	0.0146		**Winner**	0.0177	0.0179	0.0171	0.0159
	W-L	0.0012	0.0026	0.0021	0		**W-L**	0.0037	0.0039	0.0024	-0.0004
	Annual	1.50%	3.10%	2.50%	0.00%		**Annual**	4.50%	4.80%	2.90%	-0.50%
9	**Loser**	0.0134	0.0132	0.014	0.0154	**9**	**Loser**	0.0137	0.0143	0.0158	0.0176
	Winner	0.017	0.0165	0.0153	0.0142		**Winner**	0.0189	0.0178	0.016	0.0146
	W-L	0.0036	0.0033	0.0013	-0.0013		**W-L**	0.0052	0.0035	0.0003	-0.0029
	Annual	4.30%	4.00%	1.60%	-1.50%		**Annual**	6.40%	4.30%	0.30%	-3.50%
12	**Loser**	0.0133	0.0138	0.015	0.0176	**12**	**Loser**	0.0141	0.0154	0.0175	0.0188
	Winner	0.0159	0.0148	0.0138	0.0116		**Winner**	0.0167	0.0153	0.0141	0.0132
	W-L	0.0026	0.001	-0.0011	-0.0061		**W-L**	0.0026	0	-0.0034	-0.0056
	Annual	3.20%	1.20%	-1.30%	-7.00%		**Annual**	3.20%	0.00%	-4.00%	-6.50%

Panel B shows the results for a momentum strategy based on a 10-portfolio partition, which allows analysis of extreme winners and losers. Momentum returns follow a similar pattern to the 5-portfolio sort but returns are slightly higher for the more extreme stocks. Specifically, momentum returns increase when moving from short (3 months) to near long (9 months) observation and holding periods. At the longest holding periods (12 months), momentum returns are low (positive or negative) for the 3/6-month observation periods and high (but negative) for the 9/12-month observation periods. Momentum portfolio returns peak at the 9 on 3 strategy with an annual return of 6.4% and reach the highest negative return (-6.5%) for the 12 on 12 strategy. Loser portfolios always reverse, and their reversal increases moving from short to long observation and holding periods. Winners, on the other side, continue to win but at a decreasing rate with the holding/observation period. Regressing the 10-portfolio sort

momentum returns on the three- and five-factor model, all strategies generate highly insignificant alphas (see table 3.2, panels C and D). Momentum returns are fully explained by exposure to commonly known risk factors. The loser portfolios generate insignificant alphas across all strategies. However, winner portfolio excess returns (alphas) are positive and significant in 15 out 16 strategies for both the three- and five-factor models. Winner portfolio returns cannot be explained by exposure to risk factors alone. It seems that investors exercise significant buying pressure on past winning stocks during the formation period which gradually declines as the holding period increases.

Table 3.2

Regression analysis of market momentum

A regression analysis is conducted on all momentum returns along with the winner and loser portfolios for companies with strong shareholders rights (G5) and weak shareholders rights (G14). Panels A and B show alphas an p-values for 5-portfolio momentum returns regressed on the Fama and French three- and five-factor models, respectively, and panels C and D do the same for 10-portfolio momentum returns.

		Panel A				**Panel B**			
		3 FF 5 Portfolios				**5 FF 5 Portfolios**			
J	**K**	**3**	**6**	**9**	**12**	**3**	**6**	**9**	**12**
3	**Loser**	0.0004	-0.0005	-0.0008	-0.0005	0.0010	-0.0001	-0.0005	-0.0004
	p-value	(0.9061)	(0.8659)	(0.7644)	(0.8208)	(0.7738)	(0.9766)	(0.8529)	(0.8662)
	Winner	0.0004	0.0009	0.0016	0.0017	-0.0002	0.0001	0.0008	0.0011
	p-value	(0.7105)	(0.3969)	(0.0980)	(0.0688)	(0.8445)	(0.9527)	(0.4004)	(0.2576)
	W-L	-0.0031	-0.0017	-0.0007	-0.0009	-0.0043	-0.0030	-0.0018	-0.0016
	p-value	(0.4239)	(0.6051)	(0.8077)	(0.7034)	(0.2765)	(0.3912)	(0.5576)	(0.4944)
6	**Loser**	-0.0004	-0.0014	-0.0016	-0.0006	0.0006	-0.0005	-0.0010	-0.0003
	p-value	(0.9197)	(0.6923)	(0.5849)	(0.8080)	(0.8775)	(0.8839)	(0.7348)	(0.9203)
	Winner	0.0024	0.0032	0.0031	0.0025	0.0015	0.0022	0.0023	0.0019
	p-value	(0.0896)	(0.0124)	(0.0060)	(0.0218)	(0.2904)	(0.0804)	(0.0424)	(0.0811)
	W-L	-0.0004	0.0014	0.0015	0.0000	-0.0022	-0.0004	0.0002	-0.0009
	p-value	(0.9372)	(0.7360)	(0.6460)	(0.9973)	(0.6473)	(0.9280)	(0.9559)	(0.7554)
9	**Loser**	-0.0013	-0.0021	-0.0016	-0.0003	-0.0001	-0.0011	-0.0010	0.0001
	p-value	(0.7295)	(0.5244)	(0.5769)	(0.8989)	(0.9875)	(0.7307)	(0.7419)	(0.9712)
	Winner	0.0049	0.0045	0.0036	0.0026	0.0040	0.0038	0.0031	0.0021
	p-value	(0.0012)	(0.0008)	(0.0046)	(0.0357)	(0.0091)	(0.0056)	(0.0192)	(0.0935)
	W-L	0.0030	0.0034	0.0021	-0.0002	0.0009	0.0018	0.0009	-0.0011
	p-value	(0.5274)	(0.3908)	(0.5454)	(0.9454)	(0.8538)	(0.6585)	(0.7952)	(0.7261)
12	**Loser**	-0.0022	-0.0022	-0.0011	0.0013	-0.0010	-0.0014	-0.0005	0.0017
	p-value	(0.5141)	(0.4735)	(0.6830)	(0.5733)	(0.7695)	(0.6619)	(0.8506)	(0.4874)
	Winner	0.0041	0.0033	0.0025	0.0005	0.0034	0.0027	0.0020	0.0000
	p-value	(0.0056)	(0.0175)	(0.0623)	(0.7674)	(0.0259)	(0.0560)	(0.1493)	(0.9744)
	W-L	0.0032	0.0024	0.0005	-0.0040	0.0013	0.0010	-0.0006	-0.0047

	p-value	(0.4675)	(0.5433)	(0.8868)	(0.1548)	(0.7758)	(0.8067)	(0.8620)	(0.0946)
		Panel C				**Panel D**			
		3 FF 10 portfolios				**5 FF 10 portfolios**			
J	**K**	**3**	**6**	**9**	**12**	**3**	**6**	**9**	**12**
3	**Loser**	0.0006	-0.0003	0.0000	0.0003	0.0023	0.0011	0.0012	0.0013
	p-value	(0.8906)	(0.9395)	(0.9930)	(0.9123)	(0.6097)	(0.7869)	(0.7456)	(0.6902)
	Winner	0.0028	0.0028	0.0032	0.0030	0.0026	0.0025	0.0029	0.0029
	p-value	(0.0799)	(0.0368)	(0.0093)	(0.0121)	(0.1117)	(0.0670)	(0.0191)	(0.0180)
	W-L	-0.0009	0.0000	0.0001	-0.0005	-0.0002	-0.0018	-0.0015	-0.0015
	p-value	(0.8543)	(0.9993)	(0.9860)	(0.8754)	(0.9702)	(0.7066)	(0.7196)	(0.6356)
6	**Loser**	-0.0005	-0.0007	-0.0007	0.0005	0.0016	0.0011	0.0008	0.0018
	p-value	(0.9281)	(0.8709)	(0.8593)	(0.8811)	(0.7543)	(0.8111)	(0.8487)	(0.6143)
	Winner	0.0052	0.0053	0.0048	0.0040	0.0048	0.0049	0.0046	0.0041
	p-value	(0.0057)	(0.0018)	(0.0014)	(0.0044)	(0.0121)	(0.0043)	(0.0029)	(0.0052)
	W-L	0.0016	0.0029	0.0023	0.0004	0.0001	0.0007	0.0007	-0.0008
	p-value	(0.7543)	(0.5998)	(0.6080)	(0.9225)	(0.9935)	(0.9024)	(0.8827)	(0.8378)
9	**Loser**	-0.0009	-0.0011	-0.0003	0.0013	0.0017	0.0010	0.0015	0.0028
	p-value	(0.8605)	(0.7967)	(0.9430)	(0.7083)	(0.7420)	(0.8151)	(0.7134)	(0.4441)
	Winner	0.0071	0.0060	0.0048	0.0037	0.0068	0.0059	0.0049	0.0039
	p-value	(0.0009)	(0.0013)	(0.0046)	(0.0210)	(0.0020)	(0.0025)	(0.0056)	(0.0186)
	W-L	0.0049	0.0040	0.0020	-0.0008	0.0019	0.0017	0.0003	-0.0020
	p-value	(0.4606)	(0.4612)	(0.6776)	(0.8515)	(0.7766)	(0.7613)	(0.9523)	(0.6374)
12	**Loser**	-0.0015	-0.0010	0.0009	0.0021	0.0013	0.0012	0.0027	0.0036
	p-value	(0.7464)	(0.8199)	(0.8178)	(0.5547)	(0.7901)	(0.7783)	(0.4980)	(0.3213)
	Winner	0.0054	0.0045	0.0035	0.0026	0.0053	0.0047	0.0038	0.0029
	p-value	(0.0086)	(0.0166)	(0.0441)	(0.1217)	(0.0120)	(0.0154)	(0.0346)	(0.0916)
	W-L	0.0038	0.0023	-0.0005	-0.0027	0.0010	0.0003	-0.0020	-0.0039
	p-value	(0.5310)	(0.6641)	(0.9104)	(0.5244)	(0.8770)	(0.9497)	(0.6783)	(0.3710)

3.5.1.2 Corporate governance momentum

The results show that momentum returns are largely positive and are justified by exposure to commonly known risk factors such as the market, size, and value. However, the winner portfolios produce positive and significant excess returns. The follow-up analysis is on return continuation and reversal for companies with strong (G5) and weak (G14) shareholders rights. After splitting the sample of companies into strong (G5) and weak (G14) shareholder rights, analysis uses a 5- and 10-portfolio partition to further examine their momentum return behaviour. Results reported in table 3.3, panel A, show that companies with strong shareholders rights (G5) exhibit positive momentum returns in 12 out 16 strategies (5-portfolio sort). The winner portfolio return continuation is higher than the losing portfolio return reversal. The higher momentum returns are found for the 3/6 month holding period and for the 6/9/12 month

observation period. The highest return is for the 12 on 3 strategy with an 8.7% annual return. The winner portfolio continues to win at a decreasing rate as the holding period increases and at an increasing (decreasing) rate as the observation period increases from 6 to 9 to 12 months. The loser portfolio always reverses at a decreasing (increasing) rate as the observation/holding period moves 3 to 6 and from 9 to 12 months. Regressing momentum returns for strong shareholders rights companies (G5) on the three- and five-factor models generates positive but insignificant alphas (see table 3.4, panels A and B). Loser portfolios also generate small negative or small positive insignificant alphas. On the contrary, winner portfolios generate positive and significant three (five) factor alphas in 11 (9) out of 16 strategies. Past winners reach price levels so high during the holding period (or during the formation period) that cannot be justified by exposure to risk factors such as market, size, value, profitability, and investment. In other words, it seems that investors exercise increased buying pressure on past winning stocks with strong shareholders rights (G5).

Table 3.3

Cross-sectional corporate governance momentum

All stocks that have a Corporate Governance score (G index) by Gompers, Ishii and Metrick (2003) are categorised Democracy ($5 \leq$ G) and the Dictatorship ($14 \geq$ G). For each G index group, the loser and winner portfolios from a 5-portfolio (Panel A) and 10-portfolio (Panel B) strategy are shown, with equally weighted average returns for each J and K month combination. Momentum strategy buys the winner portfolio and shorts the loser portfolio. Since the strategy involves rolling portfolios, the momentum strategy is implemented each month. Monthly returns represent the equally weighted average returns from *J* months to *K* months. For each G index group, the table shows the average returns of the winner and loser portfolios along with the average returns of the momentum strategy. Sample period is January 1990 to December 2007.

Panel A: momentum 5 portfolios

J	K	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0154	0.016	0.0127	0.015	0.0129	0.0157	0.014	0.0161
	Winner	0.0127	0.0148	0.0146	0.0155	0.0148	0.016	0.0149	0.0154
	W-L	-0.0027	-0.0012	0.0019	0.0005	0.0019	0.0003	0.0009	-0.0007
	Annual	-3.20%	-1.50%	2.30%	0.60%	2.40%	0.30%	1.10%	-0.80%
6	Loser	0.0118	0.0151	0.0104	0.0148	0.0117	0.0164	0.0135	0.0174
	Winner	0.0159	0.0168	0.0161	0.0177	0.0157	0.0168	0.0144	0.0155
	W-L	0.0041	0.0016	0.0057	0.0029	0.0039	0.0005	0.0009	-0.0019
	Annual	5.10%	2.00%	7.10%	3.60%	4.80%	0.60%	1.10%	-2.30%
9	Loser	0.0111	0.0159	0.0105	0.0161	0.0124	0.0178	0.0145	0.0185
	Winner	0.0173	0.0184	0.0163	0.0176	0.0147	0.0158	0.0137	0.0148
	W-L	0.0062	0.0025	0.0058	0.0015	0.0023	-0.0019	-0.0008	-0.0037
	Annual	7.70%	3.10%	7.10%	1.80%	2.80%	-2.30%	-0.90%	-4.30%
12	Loser	0.0099	0.0172	0.0107	0.0172	0.0138	0.0185	0.0155	0.0191
	Winner	0.0169	0.0163	0.0147	0.0148	0.0137	0.0141	0.0127	0.0136
	W-L	0.007	-0.0009	0.0041	-0.0024	-0.0001	-0.0045	-0.0028	-0.0056
	Annual	8.70%	-1.00%	5.00%	-2.80%	-0.10%	-5.20%	-3.30%	-6.50%

Panel B: momentum 10 portfolios

J	K	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0157	0.0197	0.0123	0.0181	0.0137	0.0164	0.0157	0.0151
	Winner	0.0148	0.0097	0.0158	0.0117	0.0154	0.0137	0.0153	0.0123
	W-L	-0.0009	-0.01	0.0035	-0.0063	0.0017	-0.0026	-0.0004	-0.0028
	Annual	-1.10%	-11.40%	4.30%	-7.30%	2.00%	-3.10%	-0.50%	-3.30%
6	Loser	0.0091	0.0209	0.009	0.0179	0.0124	0.0177	0.0152	0.0167
	Winner	0.016	0.0106	0.0167	0.0117	0.0148	0.0122	0.0134	0.0112
	W-L	0.007	-0.0103	0.0077	-0.0063	0.0025	-0.0056	-0.0019	-0.0055
	Annual	8.70%	-11.70%	9.60%	-7.30%	3.00%	-6.50%	-2.20%	-6.40%
9	Loser	0.009	0.0191	0.0102	0.0185	0.0146	0.0177	0.0174	0.0169
	Winner	0.0171	0.0118	0.0158	0.0116	0.0138	0.0114	0.0131	0.0106
	W-L	0.0081	-0.0073	0.0056	-0.0069	-0.0008	-0.0063	-0.0043	-0.0064
	Annual	10.20%	-8.40%	7.00%	-8.00%	-0.90%	-7.30%	-5.10%	-7.40%
12	Loser	0.0091	0.0182	0.0115	0.0191	0.016	0.018	0.0192	0.0163
	Winner	0.0137	0.0096	0.0132	0.0102	0.0124	0.01	0.0112	0.0088
	W-L	0.0046	-0.0086	0.0017	-0.0089	-0.0036	-0.008	-0.008	-0.0075
	Annual	5.70%	-9.90%	2.00%	-10.20%	-4.30%	-9.20%	-9.20%	-8.60%

Table 3.4
Regression analysis of corporate governance momentum

Momentum returns as well as winner and loser portfolios for companies with strong shareholders rights (G5) and weak shareholders rights (G14) are regressed on the three-factor (panels A and C) and five-factor (panels B and D) Fama and French models, with alphas reported. Winner and loser portfolios are defined based on the 5-portfolio split (panels A and B) or 10-portfolio split (panels C and D). Sample period is January 1990 to December 2007.

Panel A

3 FF 5 portfolios

J	**K**	**3**		**6**		**9**		**12**	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0018	0.0013	-0.0014	0.0000	-0.0016	0.0008	-0.0005	0.0010
	p-value	(0.6636)	(0.7324)	(0.7033)	(0.9911)	(0.6426)	(0.8029)	(0.8657)	(0.7299)
	Winner	-0.0001	0.0005	0.0019	0.0011	0.0021	0.0019	0.0024	0.0015
	p-value	(0.9610)	(0.7700)	(0.2647)	(0.4608)	(0.1982)	(0.1412)	(0.1598)	(0.2399)
	W-L	-0.0050	-0.0040	0.0002	-0.0021	0.0006	-0.0020	-0.0002	-0.0026
	p-value	(0.2915)	(0.3473)	(0.9587)	(0.5685)	(0.8568)	(0.5372)	(0.9490)	(0.3289)
6	Loser	-0.0018	0.0009	-0.0041	0.0001	-0.0032	0.0013	-0.0019	0.0020
	p-value	(0.6963)	(0.8368)	(0.3342)	(0.9766)	(0.3977)	(0.6886)	(0.6038)	(0.4896)
	Winner	0.0037	0.0030	0.0044	0.0041	0.0040	0.0035	0.0035	0.0023
	p-value	(0.0946)	(0.0885)	(0.0331)	(0.0067)	(0.0358)	(0.0104)	(0.0644)	(0.0710)
	W-L	0.0024	-0.0011	0.0053	0.0008	0.0041	-0.0010	0.0023	-0.0028
	p-value	(0.6703)	(0.8343)	(0.2709)	(0.8486)	(0.3195)	(0.7871)	(0.5581)	(0.3802)
9	Loser	-0.0027	0.0020	-0.0041	0.0011	-0.0027	0.0022	-0.0012	0.0027
	p-value	(0.5726)	(0.6522)	(0.3311)	(0.7619)	(0.5011)	(0.4746)	(0.7569)	(0.3227)
	Winner	0.0059	0.0056	0.0054	0.0048	0.0042	0.0033	0.0038	0.0022
	p-value	(0.0113)	(0.0020)	(0.0106)	(0.0025)	(0.0440)	(0.0267)	(0.0628)	(0.1210)

	W-L	0.0054	0.0005	0.0064	0.0006	0.0038	-0.0021	0.0019	-0.0037
	p-value	(0.3380)	(0.9158)	(0.1932)	(0.8857)	(0.4092)	(0.5755)	(0.6673)	(0.2570)
12	Loser	-0.0050	0.0023	-0.0047	0.0013	-0.0020	0.0025	-0.0007	0.0033
	p-value	(0.2802)	(0.5253)	(0.2841)	(0.6826)	(0.6397)	(0.3819)	(0.8700)	(0.2273)
	Winner	0.0068	0.0033	0.0048	0.0022	0.0041	0.0017	0.0031	0.0011
	p-value	(0.0050)	(0.0599)	(0.0308)	(0.1675)	(0.0642)	(0.2819)	(0.1434)	(0.4334)
	W-L	0.0086	-0.0021	0.0064	-0.0022	0.0029	-0.0040	0.0007	-0.0052
	p-value	(0.1193)	(0.6459)	(0.2134)	(0.5780)	(0.5449)	(0.2692)	(0.8828)	(0.1114)

Panel B

5 FF 5 Portfolios

J	**K**	**3**		**6**		**9**		**12**	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0022	0.0024	-0.0012	0.0010	-0.0013	0.0015	-0.0004	0.0013
	p-value	(0.6073)	(0.5369)	(0.7467)	(0.7834)	(0.7085)	(0.6434)	(0.9101)	(0.6443)
	Winner	-0.0005	0.0004	0.0015	0.0006	0.0015	0.0013	0.0018	0.0009
	p-value	(0.8084)	(0.8350)	(0.3993)	(0.6737)	(0.3721)	(0.3285)	(0.3156)	(0.4933)
	W-L	-0.0058	-0.0052	-0.0004	-0.0034	-0.0002	-0.0034	-0.0010	-0.0036
	p-value	(0.2386)	(0.2307)	(0.9254)	(0.3510)	(0.9447)	(0.3151)	(0.7374)	(0.1972)
6	Loser	-0.0011	0.0022	-0.0037	0.0015	-0.0029	0.0023	-0.0016	0.0026
	p-value	(0.8236)	(0.6235)	(0.3961)	(0.6946)	(0.4603)	(0.4935)	(0.6787)	(0.3792)
	Winner	0.0031	0.0026	0.0039	0.0034	0.0035	0.0027	0.0032	0.0015
	p-value	(0.1738)	(0.1494)	(0.0616)	(0.0278)	(0.0756)	(0.0507)	(0.1053)	(0.2473)
	W-L	0.0011	-0.0027	0.0045	-0.0013	0.0033	-0.0027	0.0017	-0.0042
	p-value	(0.8551)	(0.6006)	(0.3636)	(0.7705)	(0.4386)	(0.4627)	(0.6844)	(0.1980)
9	Loser	-0.0017	0.0039	-0.0034	0.0027	-0.0020	0.0032	-0.0007	0.0034
	p-value	(0.7326)	(0.3806)	(0.4408)	(0.4477)	(0.6290)	(0.3125)	(0.8706)	(0.2334)
	Winner	0.0055	0.0048	0.0052	0.0039	0.0042	0.0023	0.0038	0.0011
	p-value	(0.0206)	(0.0097)	(0.0179)	(0.0151)	(0.0544)	(0.1206)	(0.0719)	(0.4244)
	W-L	0.0041	-0.0021	0.0054	-0.0019	0.0031	-0.0040	0.0014	-0.0054
	p-value	(0.4829)	(0.6832)	(0.2847)	(0.6576)	(0.5184)	(0.2920)	(0.7645)	(0.1083)
12	Loser	-0.0037	0.0041	-0.0037	0.0027	-0.0011	0.0035	-0.0001	0.0039
	p-value	(0.4371)	(0.2596)	(0.4084)	(0.4139)	(0.7952)	(0.2451)	(0.9756)	(0.1546)
	Winner	0.0065	0.0025	0.0049	0.0014	0.0042	0.0007	0.0033	0.0001
	p-value	(0.0095)	(0.1639)	(0.0340)	(0.3939)	(0.0692)	(0.6335)	(0.1446)	(0.9312)
	W-L	0.0070	-0.0047	0.0056	-0.0044	0.0022	-0.0058	0.0003	-0.0069
	p-value	(0.2181)	(0.3039)	(0.2971)	(0.2822)	(0.6625)	(0.1164)	(0.9550)	(0.0391)

Panel C

3 FF 10 Portfolios

J	K	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0023	0.0047	-0.0020	0.0037	-0.0011	0.0024	0.0010	0.0011
	p-value	(0.7043)	(0.2551)	(0.7117)	(0.2668)	(0.8320)	(0.4425)	(0.8336)	(0.6994)
	Winner	0.0023	-0.0059	0.0031	-0.0041	0.0028	-0.0018	0.0031	-0.0032
	p-value	(0.4565)	(0.0485)	(0.2022)	(0.1123)	(0.2105)	(0.4368)	(0.1824)	(0.1376)
	W-L	-0.0031	-0.0137	0.0020	-0.0109	0.0007	-0.0073	-0.0009	-0.0075

	p-value	(0.6494)	(0.0033)	(0.7297)	(0.0026)	(0.8840)	(0.0137)	(0.8214)	(0.0050)
6	Loser	-0.0042	0.0066	-0.0054	0.0037	-0.0026	0.0039	-0.0005	0.0028
	p-value	(0.5355)	(0.1351)	(0.3803)	(0.3518)	(0.6418)	(0.2748)	(0.9206)	(0.4052)
	Winner	0.0043	-0.0040	0.0048	-0.0032	0.0034	-0.0025	0.0028	-0.0037
	p-value	(0.1182)	(0.2295)	(0.0678)	(0.2445)	(0.1687)	(0.3139)	(0.2485)	(0.1315)
	W-L	0.0054	-0.0138	0.0071	-0.0100	-0.0026	-0.0096	0.0002	-0.0096
	p-value	(0.4805)	(0.0111)	(0.2958)	(0.0319)	(0.6418)	(0.0201)	(0.9696)	(0.0089)
9	Loser	-0.0038	0.0060	-0.0037	0.0050	-0.0003	0.0045	0.0018	0.0034
	p-value	(0.5860)	(0.1885)	(0.5675)	(0.2391)	(0.9606)	(0.2601)	(0.7643)	(0.3597)
	Winner	0.0066	-0.0026	0.0055	-0.0032	0.0036	-0.0036	0.0037	-0.0047
	p-value	(0.0491)	(0.4078)	(0.0671)	(0.2549)	(0.2118)	(0.1867)	(0.1813)	(0.0686)
	W-L	0.0073	-0.0117	0.0061	-0.0113	0.0008	-0.0112	-0.0012	-0.0113
	p-value	(0.3812)	(0.0325)	(0.4116)	(0.0266)	(0.9114)	(0.0181)	(0.8478)	(0.0090)
12	Loser	-0.0043	0.0049	-0.0029	0.0059	0.0004	0.0046	0.0030	0.0028
	p-value	(0.5428)	(0.2980)	(0.6644)	(0.1953)	(0.9478)	(0.2817)	(0.6265)	(0.4941)
	Winner	0.0038	-0.0045	0.0038	-0.0043	0.0035	-0.0048	0.0023	-0.0063
	p-value	(0.2528)	(0.1390)	(0.2052)	(0.1309)	(0.2330)	(0.0759)	(0.4143)	(0.0182)
	W-L	0.0049	-0.0125	0.0036	-0.0133	-0.0031	-0.0125	-0.0038	-0.0121
	p-value	(0.5417)	(0.0272)	(0.6335)	(0.0140)	(0.0000)	(0.0126)	(0.5718)	(0.0075)

Panel D

5 FF 10 Portfolios

J	K	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0028	0.0035	-0.0016	0.0016	-0.0005	0.0005	0.0016	-0.0004
	p-value	(0.6500)	(0.4160)	(0.7769)	(0.6490)	(0.9215)	(0.8707)	(0.7394)	(0.8843)
	Winner	0.0022	-0.0083	0.0028	-0.0064	0.0024	-0.0043	0.0027	-0.0058
	p-value	(0.4826)	(0.0050)	(0.2681)	(0.0120)	(0.2961)	(0.0538)	(0.2723)	(0.0061)
	W-L	-0.0037	-0.0149	0.0013	-0.0111	-0.0002	-0.0079	-0.0020	-0.0085
	p-value	(0.6033)	(0.0020)	(0.8320)	(0.0032)	(0.9713)	(0.0094)	(0.6414)	(0.0020)
6	Loser	-0.0023	0.0049	-0.0040	0.0021	-0.0015	0.0029	0.0006	0.0020
	p-value	(0.7373)	(0.2869)	(0.5318)	(0.6146)	(0.7975)	(0.4368)	(0.9137)	(0.5714)
	Winner	0.0037	-0.0058	0.0044	-0.0055	0.0031	-0.0050	0.0026	-0.0063
	p-value	(0.2019)	(0.0910)	(0.1021)	(0.0476)	(0.2352)	(0.0461)	(0.3024)	(0.0085)
	W-L	0.0029	-0.0138	0.0053	-0.0107	0.0014	-0.0109	-0.0011	-0.0114
	p-value	(0.7150)	(0.0145)	(0.4486)	(0.0280)	(0.8165)	(0.0099)	(0.8468)	(0.0025)
9	Loser	-0.0018	0.0052	-0.0024	0.0043	0.0012	0.0039	0.0032	0.0027
	p-value	(0.8030)	(0.2685)	(0.7274)	(0.3332)	(0.8436)	(0.3451)	(0.5999)	(0.4900)
	Winner	0.0066	-0.0047	0.0057	-0.0053	0.0040	-0.0059	0.0040	-0.0072
	p-value	(0.0536)	(0.1487)	(0.0641)	(0.0627)	(0.1789)	(0.0287)	(0.1626)	(0.0051)
	W-L	0.0053	-0.0130	0.0049	-0.0127	-0.0004	-0.0130	-0.0023	-0.0130
	p-value	(0.5367)	(0.0223)	(0.5179)	(0.0166)	(0.9587)	(0.0080)	(0.7238)	(0.0035)
12	Loser	-0.0017	0.0045	-0.0008	0.0054	0.0022	0.0039	0.0041	0.0018
	p-value	(0.8175)	(0.3510)	(0.9089)	(0.2527)	(0.7359)	(0.3770)	(0.5130)	(0.6644)
	Winner	0.0036	-0.0061	0.0044	-0.0060	0.0044	-0.0069	0.0030	-0.0087
	p-value	(0.2879)	(0.0475)	(0.1587)	(0.0380)	(0.1491)	(0.0115)	(0.2950)	(0.0010)

W-L	0.0022	-0.0138	0.0020	-0.0146	-0.0031	-0.0139	-0.0042	-0.0136
p-value	(0.7941)	(0.0186)	(0.7917)	(0.0096)	(0.0000)	(0.0075)	(0.5475)	(0.0038)

Returns for the 10-portfolio sort (most extreme) momentum returns of stocks with strong shareholders rights (G5) are shown in table 3, panel B. Returns show a similar return pattern to the one observed using the 5-portfolio sort. However, momentum returns are stronger and more pronounced (either positive or negative). There are positive (negative) momentum returns in 9 (7) out 16 strategies, while the negative momentum returns concentrate at longer holding periods. More, the 9 (12) on 3 (12) momentum strategy generates 10.2% (-9.2%) annual return, the highest (lowest) momentum return across all strategies. The winner portfolios continue to win at a decreasing rate as the holding/observation period increases. The loser portfolio produces reversing returns that increase with the holding period, especially at long observation periods. Regressing momentum returns of the G5 stocks on the three- and five-factor models shows insignificant alphas in most of the strategies (only the 12 on 3 strategy gives a negative significant alpha). The loser portfolios always generate negative insignificant alphas. Further, the extreme winners of the G5 stocks generate positive and significant alphas for only three strategies, the 6 on 6, 9 on 3 and the 9 on 6. Looking at extreme winners and losers of stocks with strong shareholder rights (G5) shows that exposure to risk factors explains the majority of the holding period returns.

Companies with weak shareholder rights (G14), on the other hand, show different results (see table 3.3, panel A). Looking at the 5-portfolio sort of the G14 companies, there are negative (positive) momentum returns in 9 (7) out 16 strategies with the negative momentum returns concentrating at the longest observation and holding periods. The highest momentum return, 3.6% annual, is observed for the 6 on 6 strategy and the lowest one, -6.5% annual, for the 12 on 12 strategy. The winner portfolio continues to win at a decreasing rate as the observation/holding period increases. On the contrary, the loser portfolio always reverses at an increasing rate as the observation and holding periods increase. Regressing momentum returns of weak shareholders rights companies on the three- and five-factor model generates insignificant (positive or negative) alphas across all strategies (only the 12 on 12 strategy has a negative significant five factor alpha). In the same fashion, the loser portfolios generate insignificant (positive) alphas in all cases. Winner portfolios, on the other hand, show positive and significant three- (five-) factor alphas in 8 (4) out of 16 strategies. This indicates that winner stocks with weak shareholders rights (G14) produce holding period returns that cannot

be explained by exposure to risk factors, especially for medium- (short-) to long- (medium-) term observation (holding) periods.

Results for the most extreme G14 winners and losers, from the 10-portfolio strategy, are reported in table 3.3, panel B. Results show that momentum is uniformly negative across all investment strategies with the lowest momentum return. The biggest returns are -11.7% annually, observed for the 6 on 3 strategy. Results also imply that the loser portfolio return reversal is always significantly higher than the winner portfolio return continuation. Looking closer at the loser portfolio, there are reversing returns that decrease (increase) with the holding (observation) period over time. The winner portfolio continues to win but the returns remain relatively stable across the different observation and holding periods. For example, the (six-month observation) winner portfolio returns range from 1.06% per month to 1.12% per month as moving from the 3-month holding period to 12. Regressing momentum returns on the risk factors gives negative significant (three and five factor) alphas for all 16 strategies (see table 3.4, panels C and D). Loser portfolios also produce insignificant alphas. However, the winners produce negative and significant three (five) factor alphas in 4 (15) out of 16 strategies. The results indicate that the winner portfolio returns are overexplained by exposure to risk factors. It seems that investors are reluctant to buy (or exercise significantly low buying pressure on) winning stocks with weak shareholders rights, and, as result, their prices end up at levels much lower than what their exposure to risk factors dictates. Another explanation is that extreme winners of the G14 category are sold early due to fears of being far overvalued or not being able to recover their investment. Overall, applying a 5- and 10-portfolio momentum strategy on companies with strong (G5) and weak (G14) shareholder rights has produced very interesting results. For the 5-portfolio sort, G5 stocks generate higher momentum returns than G14 stocks, which is largely explained by the high reversing returns of G14 losing stocks.

The winner portfolio of the G5 stocks produces a positive and significant alpha more often than the G14 winners do, while the loser portfolio for both the G5 and G14 stocks gives insignificant alphas. For the 10-portfolio sort (extreme winners and losers), G5 stocks produce significantly higher momentum returns than G14, but now it is the high continuing returns of the G5 winning stocks (compared to G14 winners) and the considerably high reversing returns of the G14 losing stocks (compared to G5 losers) that causes this difference. A few interesting results arise when looking at extreme winners and losers. Past winning stocks with weak shareholder rights gain considerably less compared to winning stocks with strong shareholder rights and generate

negative significant alphas. It seems that investors' buying pressure for extreme winners of the G14 category fades out quickly or simply the same stocks are sold early due to fears of being way overvalued or not being able to recover their investment (riskier). Additionally, G14 losing stocks reverse more strongly than the G5 losing stocks for short to near long holding periods (3 to 9 months), while the opposite is true for the longest holding period (12 months). In particular, investors appear to sell more aggressively when faced with quickly losing stocks with weak shareholder rights (G14) but they are reluctant and slow to sell losing stocks with strong shareholder rights.

3.5.1.3 The effect of shareholder rights vs. risk

Results show that momentum returns decrease when moving from strong shareholders rights companies G5 (democracy) to weak shareholders rights companies G14 (dictatorship). This difference is more pronounced when considering the extreme winners and losers (10-portfolio sort). In particular, the losing stocks in the G14 category earn significantly higher (reversing) returns than the G5 losing ones on the 5-portfolio sort, while the G14 winning stocks earn significantly lower returns than the G5 winning ones on the 10-portfolio sort. It is worth noting that investors are reluctant to buy (extreme) winning stocks with weak shareholder rights across all observation and holding periods. Investors seem to be selling aggressively their (extreme) losing stocks with weak shareholder rights (G14), generating high reversals at short holding periods (3 to 6 months) and across all observation periods. Importantly, results show that the reversing returns of G14 losing stocks increase with observation and holding periods, while the opposite is true for G5 losing stocks with short to medium holding period, 3 to 6 months, and across all observation periods (for both 5- and 10-portfolio sorts). It seems that investors put higher selling pressure on losing stocks with weak shareholders rights (G14) compared to stocks with strong shareholder rights (G5), while they are more reluctant to buy (extreme) winning stocks of the G14 category compared to the G5 one.

On the 5-portfolio sort, regressing winners (of weak and strong shareholder rights) on the three- and five-factor models produces mainly positive significant alphas, with G5 winners producing higher and more often significant alphas compared to G14 winners. G5 and G14 winners have similar exposure to the market (slightly above 1 on average) and size (slightly above 0.60 on average) factors, and no exposure to the value factor. G5 winners do not load on the profitability and investment factors, while G14 winners load positively and significantly on both the profitability and investment factors. On the winning side, investors buying up G14

winners seem to also prefer those with high profitability and low investment. Although the exposure of G5 winners to market and size risk is similar to that of G14 winners, G5 stocks are more frequently mispriced. Corporate governance (or shareholder rights as a characteristic) is a candidate for explaining excess returns.[22] Regressing now the reversing returns of the losing portfolios on the three and five-factor models generate insignificant alphas for both G5 and G14 stocks. Exposure to market and value factors is similar among the two stock categories. However, losing stocks of the G5 category load significantly higher on the size factor compared to losing stocks of the G14 category. Importantly, losing stocks with weak shareholder rights (G14) load negatively and significantly on the profitability factor. On the losing side, investors seem to offload more aggressively G5 stocks of small size, and G14 stocks of low profitability. On the 10-portfolio sort, the reversal of the loser portfolio is not bigger than the continuation of the winner portfolio in the G5 companies, producing positive momentum returns for the same stocks. However, the reversal of the G14 losers is greater than the continuation of the G14 winners, thus generating negative momentum returns. Regressing momentum returns on the risk factors gives positive (negative) insignificant (significant) alphas for strong (weak) shareholder right companies (see table 3.4).

Regressing the G5 and G14 winners separately produces mainly positive insignificant alphas for G5 stocks and negative significant ones for the G14 stocks. G5 and G14 winning stocks have similar exposure to the market factor (close to 1.20 on average) but G5 winners have significantly higher exposure to the size factor compared to G14 winners. Winning stocks with weak shareholder rights (G14) also load positively and significantly on the value and profitability factors. On the winning side, investors seem to choose small stocks among the G5 category, while their choice among G14 stocks seems to be focused on value and profitability (results unreported). Interestingly, G14 winners produce negative and significant five-factor alphas which means that investors are reluctant to buy (extreme) winning stocks with weak shareholders rights and, as a result they produce return continuations significantly lower than their exposure to the risk factors. Further, if investing in extreme G14 winners is more risky (due to weak shareholder rights), then investors seem to be hedging against this risk by choosing stocks with high profitability and book-to-market ratio. Looking at the reversing

[22] Companies with weak shareholder rights or corporate governance structure (G14) are possibly riskier in terms of investment recovery and less transparent in terms information disclosure. Investors might be more (less) reluctant to buy (sell) G14 winners (losers) when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas).(Gilson, 1996; Healy and Palepu, 2001; Cai, Keasey and Short, 2006; Kanagaretnam, Lobo and Whalen, 2007; Boehmer and Kelley, 2009)

returns of G5 and G14 losing portfolios, G5 stocks have a slightly higher (positive) exposure to market, size and value factors compared to G14 stocks.[23] On the losing side, investors appear to be selling G5 stocks of small size, low B/M ratio (value), and that significantly overperform the market index. However, when it comes to the extreme losing stocks of the G14 category, reversing returns load positively and significantly, though mildly, on the market, size, and value factors. The high reversing returns of the G14 category compared to the G5 category means that investors disproportionally (and more aggressively) sell G14 losing stocks compared to G5 losing ones, while their risk factor exposure indicates that they do not pay any extra attention to risk characteristics, such as profitability and investment.[24]

In summary, a momentum strategy, applied on all stocks with a corporate governance score from 1990 to 2007, generates positive returns. These returns are mainly explained by the Fama-French risk factors. A momentum strategy applied separately to stocks with weak and strong shareholders rights produces some very interesting results. First, companies with strong shareholders rights (G5) generate positive (and insignificant) momentum (excess) returns. G5 winners continue to win and produce significant positive alphas mainly at intermediate horizons (for both 5- and 10-portfolio sort). Also, G5 winners load positively and significantly only on the market and size factors. G5 losers reverse over the holding period, but their alphas are insignificant. In terms of risk factor exposure, G5 reversing returns load positively and significantly on the size and value factors. It is worth noting here that investors, on the winning side, choose G5 stocks of small size, while on the losing side, they oversell stocks of small size and low B/M ratio (value). Second, companies with weak shareholders rights (G14) generate positive and negative (insignificant) momentum (excess) returns. G14 winners continue to win and produce positive (negative) significant alphas mostly at intermediate horizons for the 5-portfolio (10-portfolio) sort. Also, G14 winners load positively and significantly on the market, size, value, and profitability factors. G14 losers reverse over the holding period but their alphas

[23] For example, in the 6 on 6 strategy, the G5 (G14) losing stock loadings on the market, size, and value factors are1.42 (1.35), 0.94 (0.74) and 0.51 (0.58) respectively.

[24] Loser stock reversing returns on the 10-portfolio sort depend on the length of the holding period. At short holding periods (3 to 6 months) G14 loser portfolios generate significantly higher (reversing) returns than G5 loser ones, but this gap becomes smaller at longer holding periods (9 to 12 months). Extreme G5 losers reverse at in increasing rate with the holding period, while extreme G14 losers reverse at a decreasing rate with the holding period. This is probably due to investors being less reluctant to sell G14 loser stocks compared to the G5 loser ones when further bad news arrives, while they are also more reluctant to add G5 stocks to their portfolio thinking that the recent decline in prices reflects a rather lasting than transitory decline in fundamentals. Moreover, holding losing stocks with weak shareholder rights is possibly riskier (lack of transparency and ambiguity over recovering investment). Therefore, investors may oversell these stocks on a downtrend and overreact on the reversal. This reversal fades as investors become more rational.

are insignificant. The G14 reversing returns do not overload, although positive and significant, on the size and value factors. It is important that investors on the winning side choose G14 stocks of high book-to-market ratio (value) and profitability, while on the losing side they seem to offload stocks of low profitability. Finally, despite the exposure of G5 and G14 winners to market and size risk being similar when tested against the three-factor model, G5 stocks are more frequently mispriced. Therefore, corporate governance (or shareholder rights as a characteristic) seem to be a candidate for explaining excess returns. Last but not least, the high reversing returns of the G14 category compared to G5, especially at 3- to 6-month holding periods, means that investors are less reluctant to sell G5 losing stocks compared to G14 losing ones, while their risk factor exposure indicates that they do not pay any extra attention to commonly known risk characteristics such as profitability and investment.[25]

3.5.1.4 Summary

After implementing a momentum strategy on the overall market (all stocks with a corporate governance score), results show that during the whole period from January 1990 to December 2007 the market exhibits positive momentum returns for short (3 months) to near long (9 months) observation and holding periods. For the longest holding periods (12 months), momentum returns are low (positive or negative) for the 3/6-month observation periods and high (but negative) for the 9/12-month observation periods. Momentum returns are simply more pronounced when using the 10-portfolio sort compared to the 5-portfolio sort. Loser portfolios reverse and their reversal increases moving from short to long observation and holding periods. Winners, on the other side, continue to win but at a decreasing rate with the holding/observation period. Interestingly, momentum portfolio returns generate highly insignificant alphas, which indicates that momentum returns are fully explained by exposure to commonly known risk factors. Also, the loser portfolios generate highly insignificant alphas across all strategies. However, the winner portfolio excess returns (alphas) are positive and significant in 15 out 16 strategies for both the three- and five-factor regressions. Winner portfolio returns cannot be explained by exposure to risk factors alone. It seems that investors

[25] Gompers, Ishii and Metrick (2003) find that a portfolio of stocks with strong shareholder rights (G5) earns higher excess returns compared to a portfolio of stocks with weak shareholder rights (G14). In this study, results for the whole period show that a higher (excess) return is earned by the G5 winner stocks compared to the G14 winners' stocks. While a higher return (reversal) is documented by the G14 loser stocks than the G5 loser stocks, both stock categories produce insignificant alphas. So, winners with strong shareholder rights (G5) are partly responsible for the positive and significant alphas earned by the portfolio of all G5 stocks. The negative and significant alphas for the G14 extreme winning stocks seem to account for the negative and significant alphas earned by the portfolio of all G14 stocks.

exercise significant buying pressure on past winning stocks during the formation period which gradually declines as the holding period increases. Overall market momentum results are consistent with the findings of Jegadeesh and Titman (1993).

However, implementing a momentum strategy on companies based on their shareholder rights (G5 and G14) produces some very interesting results. Strong shareholder rights companies (G5) generate positive (negative) momentum returns at shorter (longer) observation/holding periods. The majority of positive momentum returns are found for observation periods of 6 months (and more) and for holding periods of 6 months (and less). Momentum and loser portfolio return of strong shareholders rights companies (G5) produce insignificant alphas when regressed on the factor models. On the contrary, the winner portfolios generate positive and significant three- (five-) factor alphas for most strategies. This means that past winners reach price levels so high during the holding period (or ever during the formation period) that cannot be justified by exposure to risk factors alone.

Further, when examining the more extreme past winners of the G5 stocks, excess returns are positive and significant only in three strategies. On the other hand, for companies with weak shareholder rights (G14) there are largely negative momentum returns that also strengthen at the longest observation and holding periods. The momentum and loser portfolio return of the G14 stocks also produce insignificant three- and five-factor alphas. Still, the winner portfolio excess returns are positive and significant for medium (short) to long (medium) term observation (holding) periods. Looking at the extreme winners and losers in the G14 category, there are not only negative momentum returns across all strategies but also negative and significant (three- and five-factor) alphas in all cases. This is mainly explained by the low holding period returns of the past G14 winners, which also come with highly negative and significant 5-factor alphas. Investors are reluctant to buy (or exercise significantly low buying pressure on) extreme winning stocks with weak shareholders rights. As a result, their prices end up significantly low compared to their risk factor exposure. A comparison of the factor model loadings across the G5 and G14 winning stocks shows that both stock categories load similarly and significantly on the market and size factors but only G14 winners load significantly (and positively) on the value factor. Extreme winners of the G14 category load positively on the profitability factor. When it comes to past losing stocks, G5 and G14 stocks load similarly (positive) and significantly on the market and value factors for the three- and five-factor models. However, G5 losing stocks load significantly more strongly on the size

factor compared to G14 losing stocks, and their difference becomes even bigger for the 10-portfolio partition. Only the G14 losing stocks load negatively and significantly on the profitability factor. Comparing the 5-portfolio momentum strategy on strong (G5) and weak (G14) shareholder rights companies shows that G5 stocks have mainly positive momentum returns, while G14 stocks have negative momentum returns. This result is mainly explained by the fact that the reversing returns of the G14 category are higher than the (reversing) returns of the G5 category. Also, the winner portfolios of the weak shareholder rights companies (G14) generate larger returns than that of strong shareholder rights (G5) companies. Considering the most extreme winners and losers, there are momentum returns that are more pronounced either on the positive (for G5 stocks) or negative (for G14 stocks) side. Interestingly, the reversing returns of the G14 losing stocks are now significantly higher than the reversing returns of the G5 losing stocks. On the contrary, the return continuation of the G5 winner stocks is significantly higher than the return continuation of the G14 loser stocks.

When regressing the 10-portfolio momentum returns on the three-factor model, winners of both G5 and G14 have significant exposure to the market factor. However, winners of the G5 category have significantly greater exposure to the size factor compared to G14 ones. This shows that investors would buy (extreme) past winning G5 stocks of small size and high correlation with the market portfolio. Further, when G14 companies win, investors seem to prefer stocks with high B/M ratio (value) and correlation with the market. When considering the loser portfolio, both G5 and G14 stocks have significant (and positive) exposure to the market and value factors, but only G5 losing stocks load significantly strongly and positively on the size factor. Over the whole period, investors would sell G14 (extreme) losing stocks of small size, high B/M ratio (value) and near perfect correlation with the market. On the other hand, investors would sell G5 (extreme) losing stocks of high B/M ratio (value), very small size, and that significantly outperform the market.

3.5.2 Expansion period (1990–1999)

3.5.2.1 Market momentum

Analysis of the expansion period begins with the overall momentum (of all companies with a corporate governance G-index score) across different observation and holding periods. Analysis covers an overall momentum strategy based on 5 and 10 portfolio partitions. Allowing for finer division of winners and losers helps in examining the effect of extreme returns in the

market and how these returns contribute to the overall momentum. In summary, extreme winners and losers contribute more to the overall momentum, with the 10-portfolio case showing higher momentum returns than the 5-portfolio one. Also, overall momentum returns (over all companies with G-index score) increase when the observation/holding period increases up to 12 months. These findings are consistent with those of Jegadeesh and Titman (1993). Panel A of table 3.5 reports momentum returns for the 5-portfolio partition. Out of 16 different momentum strategies, 12 exhibit positive returns. The 12 on 3 strategy gives the highest momentum return (9.96% annual return), while the 3 on 3 strategy gives the lowest momentum returns (-2.02% annual return). The momentum return is driven by the winner portfolios as they continue to win even when the loser portfolio is reversing. Momentum returns increase when moving towards longer observation and holding periods. Although the 5-portfolio momentum generates positive returns, these returns are mainly explained by the three- and five-factor models of Fama and French. Regressing the winner portfolio and loser portfolio separately gives a better understanding of the results (see table 3.6). The regression results show that winner portfolios generate positive significant alphas when regressed on the three and five risk factors. On the other hand, the loser portfolio generates negative insignificant alphas indicating that the risk factors over explain the reversing returns of the loser portfolio.

The next analysis looks at momentum based on 10 portfolios (panel B of table 3.5). This classification is intended to focus on the most extreme winners and losers in the market. When focusing on the extreme stocks, it shows that all 16 strategies generate positive momentum returns, and they are significantly higher than 5-portfolio ones. The lowest returns (1.22% annual return) are for the 3 on 3 strategy and the highest (12.48%) are for the 9 on 6 strategy. Similar to the 5-portfolio example, the winner portfolio, with its continuation, is the main driver of momentum returns, while the loser portfolio reversal attenuates momentum returns. Risk factors explain the momentum returns when regressed on the three- and five-factor model.

Table 3.5
Cross-sectional market momentum (1990–2000)

Cross-sectional momentum is formed based on observation period *J* months and holding period *K* months. Stocks are ranked based on their past performance over *J* months in ascending order. 5 equally weighted portfolios (panel A) and 10 equally weighted portfolios (panel B) are formed based on the past *J* months performance, where P1 is the loser portfolio and P5/P10 is the winning portfolio. Stocks with the most returns over the observation period *J* months (P5/P10) are bought, and stocks with the lowest performance over *J* months (P1) are sold. Average monthly returns and corporate governance score (G) are shown for each portfolio from January 1990 to December 1999.

Panel A						**Panel B**					
Momentum 5 portfolios						**Momentum 10 portfolios**					
J		3	6	9	12	***J***		3	6	9	12
3	Loser	0.0168	0.0153	0.0143	0.0144	3	Loser	0.017	0.0156	0.0153	0.0154
	Winner	0.0151	0.0152	0.0168	0.0172		Winner	0.018	0.0174	0.019	0.0194
	W-L	-0.0017	-0.0001	0.0024	0.0029		W-L	0.001	0.0018	0.0037	0.004
	Annual	-2.02%	-0.14%	2.95%	3.50%		Annual	1.22%	2.23%	4.57%	4.89%
6	Loser	0.0154	0.0135	0.013	0.0143	6	Loser	0.015	0.0139	0.014	0.0158
	Winner	0.0163	0.0178	0.0187	0.018		Winner	0.0195	0.0207	0.0216	0.0205
	W-L	0.0009	0.0043	0.0058	0.0037		W-L	0.0045	0.0068	0.0076	0.0047
	Annual	1.10%	5.28%	7.13%	4.56%		Annual	5.56%	8.53%	9.48%	5.82%
9	Loser	0.014	0.0124	0.0132	0.0149	9	Loser	0.0142	0.0134	0.0148	0.0169
	Winner	0.02	0.0203	0.0197	0.0184		Winner	0.0231	0.0233	0.0222	0.0206
	W-L	0.0059	0.0079	0.0065	0.0034		W-L	0.0088	0.0099	0.0074	0.0037
	Annual	7.34%	9.94%	8.15%	4.22%		Annual	11.15%	12.48%	9.30%	4.50%
12	Loser	0.0126	0.0126	0.014	0.0155	12	Loser	0.0138	0.014	0.0162	0.0178
	Winner	0.0206	0.0195	0.0188	0.0176		Winner	0.0233	0.0223	0.0209	0.0195
	W-L	0.0079	0.0069	0.0048	0.0022		W-L	0.0095	0.0083	0.0048	0.0016
	Annual	9.96%	8.58%	5.90%	2.62%		Annual	12.07%	10.44%	5.86%	1.94%

However, when regressing the winner and loser portfolios separately, the winner portfolio exhibits positive significant alpha, while the loser portfolio exhibits negative insignificant alpha (see table 3.6). For example, for observation period 9 and holding periods 3, 6, 9 and 12, there are significant (at 10% significance level) monthly (five factor) alphas of 0.0084, 0.0081, 0.0070 and 0.0053 respectively.

Given that there is momentum in the overall market (all companies with G-index score) the next analysis is to look for cross-sectional momentum across the different G-index scores to investigate whether the level of corporate governance is associated with momentum returns.

Table 3.6
Regression analysis of market momentum (1990–2000)

Momentum returns, as well as winner and loser portfolios, are regressed on the three-factor (panels A and C) and five-factor (panels B and D) Fama and French models, with alphas reported. Winners and losers are based on a 5-portfolio split (panels A and B) or 10-portfolio split (panels C and D). Analysis covers the expansion period from January 1990 to December 1999.

		Panel A				**Panel B**			
		3 FF 5 Portfolios				**5 FF 5 Portfolios**			
J	**K**	3	6	9	12	3	6	9	12
3	Loser	0.0005	-0.0008	-0.0015	-0.0013	-0.0001	-0.0013	-0.0018	-0.0018
	p-value	(0.8549)	(0.7292)	(0.4884)	(0.4910)	(0.9700)	(0.5908)	(0.3964)	(0.3710)
	Winner	0.0002	-0.0003	0.0015	0.0018	0.0005	-0.0002	0.0015	0.0017
	p-value	(0.8722)	(0.7621)	(0.1097)	(0.0591)	(0.6483)	(0.8239)	(0.1401)	(0.0852)
	W-L	-0.0040	-0.0031	-0.0007	-0.0006	-0.0031	-0.0026	-0.0003	-0.0002
	p-value	(0.2149)	(0.2341)	(0.7642)	(0.7793)	(0.3520)	(0.3430)	(0.8803)	(0.9205)
6	Loser	-0.0005	-0.0021	-0.0025	0.0022	-0.0010	-0.0025	-0.0028	0.0024
	p-value	(0.8661)	(0.4153)	(0.2822)	(0.4246)	(0.7489)	(0.3612)	(0.2400)	(0.4096)
	Winner	0.0011	0.0025	0.0034	0.0034	0.0013	0.0024	0.0032	0.0032
	p-value	(0.3765)	(0.0424)	(0.0038)	(0.0038)	(0.3020)	(0.0598)	(0.0078)	(0.0078)
	W-L	-0.0020	0.0010	0.0022	-0.0025	-0.0013	0.0012	0.0024	-0.0028
	p-value	(0.5784)	(0.7612)	(0.4246)	(0.2822)	(0.7239)	(0.7131)	(0.4096)	(0.2400)
9	Loser	-0.0013	-0.0029	-0.0020	-0.0002	-0.0016	-0.0031	-0.0023	-0.0006
	p-value	(0.6673)	(0.2772)	(0.4059)	(0.9249)	(0.6039)	(0.2564)	(0.3529)	(0.8121)
	Winner	0.0051	0.0051	0.0043	0.0028	0.0052	0.0050	0.0042	0.0025
	p-value	(0.0005)	(0.0003)	(0.0010)	(0.0191)	(0.0005)	(0.0006)	(0.0019)	(0.0381)
	W-L	0.0027	0.0043	0.0027	-0.0006	0.0032	0.0045	0.0029	-0.0005
	p-value	(0.4747)	(0.2049)	(0.3815)	(0.8216)	(0.4154)	(0.2014)	(0.3656)	(0.8570)
12	Loser	-0.0024	-0.0024	-0.0010	0.0005	-0.0027	-0.0027	-0.0013	0.0003
	p-value	(0.4101)	(0.3770)	(0.6954)	(0.8342)	(0.3780)	(0.3312)	(0.6309)	(0.9140)
	Winner	0.0053	0.0040	0.0030	0.0016	0.0054	0.0039	0.0028	0.0013
	p-value	(0.0005)	(0.0044)	(0.0198)	(0.1759)	(0.0005)	(0.0065)	(0.0379)	(0.2908)
	W-L	0.0040	0.0027	0.0004	-0.0025	0.0044	0.0030	0.0004	-0.0026
	p-value	(0.2916)	(0.4382)	(0.9079)	(0.4040)	(0.2611)	(0.4090)	(0.9057)	(0.4045)

		Panel C				Panel D			
		3 FF 10 portfolios				5 FF 10 portfolios			
J	**K**	3	6	9	12	3	6	9	12
3	Loser	0.0009	-0.0005	-0.0003	-0.0003	0.0009	-0.0004	-0.0003	-0.0002
	p-value	(0.8030)	(0.8850)	(0.9157)	(0.9127)	(0.8024)	(0.8997)	(0.9136)	(0.9429)
	Winner	0.0044	0.0029	0.0045	0.0044	0.0036	0.0024	0.0040	0.0041
	p-value	(0.0054)	(0.0425)	(0.0016)	(0.0021)	(0.0239)	(0.0898)	(0.0036)	(0.0038)
	W-L	-0.0009	-0.0009	0.0007	0.0006	-0.0002	-0.0003	0.0011	0.0011
	p-value	(0.8271)	(0.8058)	(0.8143)	(0.8055)	(0.9702)	(0.9370)	(0.7180)	(0.6888)
6	Loser	-0.0009	-0.0018	-0.0017	0.0001	-0.0007	-0.0017	-0.0016	0.0002
	p-value	(0.8212)	(0.6307)	(0.6133)	(0.9822)	(0.8718)	(0.6500)	(0.6297)	(0.9484)
	Winner	0.0054	0.0060	0.0067	0.0056	0.0047	0.0056	0.0064	0.0053
	p-value	(0.0022)	(0.0007)	(0.0001)	(0.0003)	(0.0071)	(0.0012)	(0.0001)	(0.0005)
	W-L	0.0017	0.0036	0.0043	0.0014	0.0027	0.0042	0.0047	0.0019
	p-value	(0.7258)	(0.3965)	(0.2447)	(0.6805)	(0.5906)	(0.3424)	(0.2139)	(0.6027)
9	Loser	-0.0007	-0.0015	-0.0003	0.0017	-0.0007	-0.0017	-0.0004	0.0016
	p-value	(0.8761)	(0.7077)	(0.9303)	(0.6227)	(0.8686)	(0.6635)	(0.9042)	(0.6287)
	Winner	0.0092	0.0086	0.0075	0.0056	0.0084	0.0081	0.0070	0.0053
	p-value	(0.0000)	(0.0000)	(0.0001)	(0.0009)	(0.0000)	(0.0000)	(0.0001)	(0.0014)
	W-L	0.0055	0.0061	0.0038	0.0000	0.0062	0.0065	0.0042	0.0003
	p-value	(0.2985)	(0.1872)	(0.3735)	(0.9976)	(0.2510)	(0.1783)	(0.3462)	(0.9499)
12	Loser	-0.0007	-0.0008	0.0015	0.0030	-0.0010	-0.0009	0.0013	0.0029
	p-value	(0.8735)	(0.8512)	(0.6940)	(0.4041)	(0.8218)	(0.8173)	(0.7223)	(0.4090)
	Winner	0.0093	0.0077	0.0060	0.0041	0.0083	0.0070	0.0056	0.0038
	p-value	(0.0000)	(0.0001)	(0.0013)	(0.0185)	(0.0001)	(0.0004)	(0.0020)	(0.0226)
	W-L	0.0057	0.0043	0.0006	-0.0028	0.0063	0.0048	0.0009	-0.0026
	p-value	(0.2858)	(0.3768)	(0.8851)	(0.5029)	(0.2486)	(0.3422)	(0.8516)	(0.5382)

3.5.2.2 Corporate governance momentum

The next analysis implements a momentum strategy by corporate governance (G-index) score. The aim is to examine whether weak or strong shareholder rights influence investor decisions when they buy winning and sell losing stocks in the market. In particular, the momentum strategy is conducted separately for firms with strong shareholder rights, and for companies with G index score of 14 and above, which are companies with weak shareholders rights, following the methodology of Gompers, Ishii and Metrick (2003). Past winners and losers are sorted into 5 and 10 portfolios, with the 10-portfolio partition identifying the most extreme winners and losers among companies with the strongest (G5)/weakest (G14) shareholder rights.

Panel A of table 3.7 presents portfolio momentum returns for the two G-index scores and observation/holding periods ranging from 3 to 12 months. First, analysis of momentum returns for strong shareholder rights (democratic) companies (G5) and a 5-portfolio sort. Results show that 14 out of 16 tested momentum strategies generate positive returns. Momentum returns seem to increase (decrease) at longer observation (holding) periods. The highest momentum return (12.3%) is observed when implementing a 12 on 3 strategy, while the lowest (-3.9%) is

observed when a 3 on 3 strategy is implemented. In all the different strategies, past winners continue to win, and past losers strongly reverse over the holding period. Since a momentum strategy buys the winner and shorts the loser, strong winning continuation offsets the loses from the losing portfolio reversal and results in positive momentum returns.

Table 3.7
Cross-sectional corporate governance momentum (1990–2000)

Separately for stocks with a corporate governance score of 5 or less (G5) or with 14 or greater (G14), average returns for momentum, winner, and loser portfolios are shown for different combinations of holding period *J* and observation period *K* .The momentum strategy buys the winner portfolio and shorts the loser portfolio. Since the strategy involves rolling portfolios, momentum strategy is implemented each month, the monthly returns represent the equally weighted average returns from *J* months to *K* months. Winners and losers based on a 5-portfolio (panel A) or 10-portfolio split (panel B). Sample period is January 1990 to December 1999.

Panel A

Momentum 5 portfolios

J	**K**	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0176	0.0189	0.0149	0.0168	0.0146	0.017	0.0168	0.017
	Winner	0.0143	0.0168	0.0151	0.0167	0.0167	0.0186	0.0154	0.0186
	W-L	-0.0033	-0.0021	0.0002	-0.0001	0.0021	0.0016	-0.0014	0.0016
	Annual	-3.90%	-2.50%	0.30%	-0.20%	2.50%	2.00%	-1.70%	1.90%
6	Loser	0.0143	0.0177	0.0119	0.0158	0.0129	0.0167	0.0147	0.0178
	Winner	0.0169	0.0187	0.018	0.0199	0.0187	0.0205	0.0179	0.0194
	W-L	0.0025	0.0009	0.0061	0.0041	0.0058	0.0038	0.0032	0.0015
	Annual	3.10%	1.10%	7.60%	5.10%	7.20%	4.70%	4.00%	1.90%
9	Loser	0.0129	0.0172	0.0118	0.0155	0.0132	0.0172	0.015	0.0186
	Winner	0.0204	0.0214	0.0195	0.0214	0.019	0.0202	0.0181	0.0191
	W-L	0.0075	0.0042	0.0077	0.0059	0.0058	0.003	0.0032	0.0004
	Annual	9.40%	5.20%	9.60%	7.30%	7.20%	3.70%	3.90%	0.50%
12	Loser	0.0107	0.0173	0.0116	0.0166	0.0142	0.018	0.0156	0.0197
	Winner	0.0205	0.0202	0.019	0.0186	0.0188	0.0183	0.0173	0.0178
	W-L	0.0097	0.0029	0.0074	0.0021	0.0046	0.0004	0.0017	-0.0018
	Annual	12.30%	3.60%	9.20%	2.50%	5.70%	0.40%	2.10%	-2.20%

Panel B

Momentum 10 portfolios

J	K	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0193	0.0181	0.0155	0.0176	0.0162	0.0146	0.0178	0.0128
	Winner	0.0164	0.0085	0.0165	0.0105	0.018	0.0118	0.0183	0.0114
	W-L	-0.0029	-0.0096	0.0009	-0.0071	0.0018	-0.0028	0.0006	-0.0014
	Annual	-3.40%	-10.90%	1.10%	-8.10%	2.20%	-3.30%	0.70%	-1.60%
6	Loser	0.0121	0.0208	0.0107	0.0169	0.0135	0.0155	0.0163	0.0145
	Winner	0.0172	0.0093	0.0195	0.0114	0.019	0.0126	0.0181	0.0118
	W-L	0.005	-0.0115	0.0088	-0.0055	0.0054	-0.0029	0.0018	-0.0027
	Annual	6.20%	-13.00%	11.10%	-6.40%	6.70%	-3.40%	2.20%	-3.20%
9	Loser	0.013	0.0191	0.0122	0.016	0.016	0.0148	0.0184	0.0149
	Winner	0.0218	0.011	0.0212	0.0116	0.0203	0.0121	0.0196	0.0119
	W-L	0.0088	-0.0082	0.0089	-0.0044	0.0042	-0.0027	0.0012	-0.003

	Annual	11.10%	-9.40%	11.30%	-5.10%	5.20%	-3.20%	1.50%	-3.60%
12	Loser	0.0122	0.0167	0.0129	0.0154	0.0163	0.0135	0.0189	0.0133
	Winner	0.0194	0.011	0.0195	0.0115	0.0192	0.012	0.0174	0.0112
	W-L	0.0072	-0.0057	0.0066	-0.004	0.0029	-0.0015	-0.0015	-0.0022
	Annual	9.00%	-6.60%	8.20%	-4.70%	3.50%	-1.80%	-1.80%	-2.60%

Regressing momentum returns of strong shareholder rights companies (of G-index score 5 and less) on the three- and five-factor models generates positive but insignificant alphas. However, when looking at winner and loser portfolios separately, the winner portfolio generates positive significant alphas mainly for strategies 9 on 3, 9 on 6, 9 on 9 and 12 on 3, while the loser portfolio generates uniformly negative and insignificant alphas. The highest 3 (5) FF alpha is found when implementing the 12 on 3 strategy, at 0.0064 (0.0067). In summary, all the winner portfolios generate positive alphas but only a few of those alphas are significant.

Table 3.8

Regression analysis of corporate governance momentum (1990–2000)

Momentum, winner, and loser portfolios are regressed on the three-factor (panels A and C) and five-factor (panels B and D) Fama and French models, with alphas reported. Analysis is performed separately for companies with strong shareholders rights (G5) and weak shareholders rights (G14). Winners and losers are based on a 5-portfolio split (panels A and B) or 10-portfolio split (panels C and D). The sample window is form January 1990 to December 1999.

Panel A

3 FF 5 Portfolios

J		3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0042	0.0031	0.0016	0.0007	0.0012	0.0014	0.0018	0.0018
	p-value	(0.3814)	(0.3399)	(0.7195)	(0.8195)	(0.7613)	(0.6071)	(0.6251)	(0.4956)
	Winner	-0.0003	0.0032	-0.0002	0.0018	0.0015	0.0035	0.0020	0.0026
	p-value	(0.8839)	(0.1456)	(0.9113)	(0.3436)	(0.4945)	(0.0397)	(0.3574)	(0.1069)
	W-L	-0.0081	-0.0039	-0.0055	-0.0025	-0.0034	-0.0016	-0.0034	-0.0028
	p-value	(0.1077)	(0.3671)	(0.2175)	(0.4631)	(0.3688)	(0.5916)	(0.2510)	(0.2860)
6	Loser	0.0016	0.0023	-0.0009	0.0005	0.0002	0.0017	0.0018	0.0029
	p-value	(0.7737)	(0.5265)	(0.8589)	(0.8870)	(0.9684)	(0.5688)	(0.6709)	(0.3161)
	Winner	0.0023	0.0037	0.0030	0.0047	0.0037	0.0047	0.0034	0.0030
	p-value	(0.3766)	(0.0988)	(0.2534)	(0.0131)	(0.1302)	(0.0093)	(0.1426)	(0.0738)
	W-L	-0.0029	-0.0022	0.0002	0.0005	-0.0001	-0.0007	-0.0021	-0.0036
	p-value	(0.6151)	(0.6281)	(0.9645)	(0.8904)	(0.9808)	(0.8377)	(0.5963)	(0.2620)
9	loser	0.0006	0.0037	-0.0006	0.0015	0.0008	0.0029	0.0026	0.0041
	p-value	(0.9104)	(0.3398)	(0.9065)	(0.6651)	(0.8557)	(0.3472)	(0.5619)	(0.1601)
	Winner	0.0055	0.0071	0.0046	0.0060	0.0042	0.0044	0.0036	0.0027
	p-value	(0.0491)	(0.0027)	(0.0774)	(0.0056)	(0.0914)	(0.0241)	(0.1211)	(0.1188)
	W-L	0.0012	-0.0003	0.0015	0.0008	-0.0003	-0.0022	-0.0026	-0.0051
	p-value	(0.8318)	(0.9559)	(0.7647)	(0.8480)	(0.9526)	(0.5677)	(0.5590)	(0.1445)
	loser	-0.0013	0.0042	-0.0002	0.0026	0.0022	0.0040	0.0036	0.0054

	p-value	(0.8020)	(0.2637)	(0.9677)	(0.4431)	(0.6530)	(0.2154)	(0.4478)	(0.0781)
12	Winner	0.0064	0.0043	0.0041	0.0022	0.0038	0.0018	0.0021	0.0009
	p-value	(0.0304)	(0.0588)	(0.1179)	(0.3048)	(0.1334)	(0.3670)	(0.3776)	(0.6260)
	W-L	0.0041	-0.0036	0.0007	-0.0041	-0.0021	-0.0058	-0.0051	-0.0082
	p-value	(0.4581)	(0.4569)	(0.8968)	(0.3432)	(0.6752)	(0.1491)	(0.2808)	(0.0268)

Panel B

5 FF 5 portfolios

J		3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
	Loser	0.0020	0.0029	-0.0005	0.0009	-0.0005	0.0013	0.0002	0.0014
	p-value	(0.6727)	(0.3812)	(0.9147)	(0.7577)	(0.9062)	(0.6449)	(0.9560)	(0.5949)
3	Winner	0.0002	0.0034	0.0001	0.0025	0.0017	0.0038	0.0021	0.0027
	p-value	(0.9154)	(0.1318)	(0.9660)	(0.1890)	(0.4485)	(0.0237)	(0.3486)	(0.0905)
	W-L	-0.0054	-0.0032	-0.0031	-0.0021	-0.0014	-0.0012	-0.0017	-0.0024
	p-value	(0.2823)	(0.4745)	(0.4908)	(0.5554)	(0.7029)	(0.7017)	(0.5638)	(0.3860)
	Loser	-0.0008	0.0023	-0.0032	0.0009	-0.0019	0.0017	0.0001	0.0025
	p-value	(0.8917)	(0.5397)	(0.5268)	(0.7871)	(0.6612)	(0.5907)	(0.9729)	(0.4029)
6	Winner	0.0031	0.0045	0.0035	0.0050	0.0040	0.0047	0.0035	0.0029
	p-value	(0.2437)	(0.0487)	(0.1968)	(0.0068)	(0.1181)	(0.0077)	(0.1434)	(0.0825)
	W-L	0.0002	-0.0015	0.0030	0.0005	0.0022	-0.0006	-0.0003	-0.0032
	p-value	(0.9745)	(0.7589)	(0.5542)	(0.9083)	(0.6002)	(0.8664)	(0.9341)	(0.3231)
	loser	-0.0016	0.0045	-0.0028	0.0023	-0.0010	0.0028	0.0011	0.0037
	p-value	(0.7655)	(0.2574)	(0.5698)	(0.5112)	(0.8355)	(0.3759)	(0.8145)	(0.2200)
9	Winner	0.0059	0.0077	0.0049	0.0060	0.0044	0.0042	0.0034	0.0024
	p-value	(0.0394)	(0.0013)	(0.0729)	(0.0052)	(0.0891)	(0.0290)	(0.1578)	(0.1755)
	W-L	0.0039	-0.0004	0.0040	0.0001	0.0017	-0.0023	-0.0013	-0.0050
	p-value	(0.5012)	(0.9304)	(0.4392)	(0.9817)	(0.7236)	(0.5750)	(0.7763)	(0.1680)
	loser	-0.0037	0.0049	-0.0024	0.0031	0.0005	0.0037	0.0023	0.0049
	p-value	(0.4816)	(0.2035)	(0.6391)	(0.3671)	(0.9240)	(0.2602)	(0.6386)	(0.1179)
12	Winner	0.0067	0.0044	0.0042	0.0019	0.0036	0.0015	0.0018	0.0004
	p-value	(0.0287)	(0.0522)	(0.1245)	(0.3480)	(0.1592)	(0.4566)	(0.4618)	(0.8083)
	W-L	0.0068	-0.0041	0.0029	-0.0048	-0.0005	-0.0059	-0.0041	-0.0081
	p-value	(0.2238)	(0.4051)	(0.5811)	(0.2800)	(0.9265)	(0.1619)	(0.4024)	(0.0342)

Panel C

3 FF 10 Portfolios

J		3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
	Loser	0.0075	0.0039	0.0036	0.0031	0.0041	0.0006	0.0053	-0.0018
	p-value	(0.3179)	(0.3272)	(0.6010)	(0.4206)	(0.5211)	(0.8770)	(0.3406)	(0.6009)
3	Winner	0.0026	-0.0063	0.0017	-0.0050	0.0028	-0.0042	0.0039	-0.0050
	p-value	(0.4507)	(0.0630)	(0.5973)	(0.0739)	(0.3595)	(0.0898)	(0.2341)	(0.0426)
	W-L	-0.0086	-0.0139	-0.0056	-0.0118	-0.0049	-0.0084	-0.0051	-0.0068
	p-value	(0.2582)	(0.0085)	(0.4001)	(0.0046)	(0.3963)	(0.0210)	(0.2421)	(0.0263)
	Loser	0.0033	0.0057	-0.0005	0.0030	0.0021	0.0017	0.0046	-0.0003
	p-value	(0.6916)	(0.2699)	(0.9519)	(0.5098)	(0.7563)	(0.6930)	(0.4891)	(0.9440)
6	Winner	0.0033	-0.0069	0.0045	-0.0058	0.0044	-0.0050	0.0040	-0.0058

	p-value	(0.3580)	(0.0735)	(0.2196)	(0.0697)	(0.1907)	(0.0821)	(0.1956)	(0.0376)
	W-L	-0.0036	-0.0163	0.0013	-0.0125	-0.0014	-0.0104	-0.0043	-0.0092
	p-value	(0.6749)	(0.0113)	(0.8642)	(0.0197)	(0.8299)	(0.0350)	(0.4871)	(0.0248)
	Loser	0.0032	0.0059	0.0025	0.0019	0.0061	0.0008	0.0080	0.0002
	p-value	(0.7182)	(0.2772)	(0.7544)	(0.6966)	(0.4181)	(0.8640)	(0.2849)	(0.9548)
9	Winner	0.0079	-0.0046	0.0066	-0.0056	0.0057	-0.0050	0.0054	-0.0055
	p-value	(0.0604)	(0.2506)	(0.0877)	(0.1006)	(0.1166)	(0.1164)	(0.1194)	(0.0675)
	W-L	0.0010	-0.0142	0.0005	-0.0111	-0.0040	-0.0094	-0.0063	-0.0094
	p-value	(0.9114)	(0.0341)	(0.9543)	(0.0623)	(0.5894)	(0.0936)	(0.3841)	(0.0479)
	Loser	0.0042	0.0023	0.0044	0.0020	0.0068	-0.0001	0.0094	-0.0011
	p-value	(0.6357)	(0.6777)	(0.5950)	(0.7011)	(0.3819)	(0.9839)	(0.2238)	(0.7925)
12	Winner	0.0059	-0.0056	0.0050	-0.0061	0.0047	-0.0055	0.0025	-0.0066
	p-value	(0.1528)	(0.1497)	(0.1734)	(0.0738)	(0.1813)	(0.0907)	(0.4710)	(0.0394)
	W-L	-0.0020	-0.0115	-0.0030	-0.0117	-0.0057	-0.0090	-0.0106	-0.0091
	p-value	(0.8279)	(0.0819)	(0.7154)	(0.0574)	(0.4660)	(0.1186)	(0.1734)	(0.0655)

Panel D

5 FF 10 portfolios

J		3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
	Loser	0.0046	0.0029	0.0008	0.0014	0.0017	-0.0012	0.0032	-0.0038
	p-value	(0.5478)	(0.4855)	(0.9128)	(0.7257)	(0.7950)	(0.7473)	(0.5722)	(0.2770)
3	Winner	0.0034	-0.0070	0.0025	-0.0064	0.0036	-0.0056	0.0043	-0.0067
	p-value	(0.3290)	(0.0359)	(0.4409)	(0.0220)	(0.2656)	(0.0212)	(0.2003)	(0.0056)
	W-L	-0.0104	-0.0140	-0.0019	-0.0114	-0.0018	-0.0081	-0.0025	-0.0066
	p-value	(0.1339)	(0.0034)	(0.7755)	(0.0076)	(0.7585)	(0.0326)	(0.5569)	(0.0385)
	Loser	0.0004	0.0037	-0.0033	0.0011	-0.0008	-0.0002	0.0024	-0.0023
	p-value	(0.9638)	(0.4840)	(0.6654)	(0.8183)	(0.9069)	(0.9602)	(0.7275)	(0.5684)
6	Winner	0.0044	-0.0072	0.0056	-0.0067	0.0052	-0.0060	0.0046	-0.0072
	p-value	(0.2347)	(0.0702)	(0.1396)	(0.0440)	(0.1321)	(0.0448)	(0.1496)	(0.0119)
	W-L	0.0004	-0.0145	0.0052	-0.0114	0.0023	-0.0094	-0.0014	-0.0085
	p-value	(0.9642)	(0.0266)	(0.4897)	(0.0388)	(0.7175)	(0.0634)	(0.8184)	(0.0442)
	Loser	-0.0007	0.0039	-0.0014	-0.0002	0.0032	-0.0009	0.0057	-0.0015
	p-value	(0.9359)	(0.4779)	(0.8611)	(0.9717)	(0.6732)	(0.8510)	(0.4582)	(0.7215)
9	Winner	0.0093	-0.0049	0.0079	-0.0062	0.0066	-0.0058	0.0057	-0.0068
	p-value	(0.0312)	(0.2366)	(0.0483)	(0.0759)	(0.0791)	(0.0743)	(0.1092)	(0.0265)
	W-L	0.0063	-0.0124	0.0057	-0.0097	-0.0003	-0.0086	-0.0036	-0.0089
	p-value	(0.4916)	(0.0660)	(0.4838)	(0.1113)	(0.9693)	(0.1401)	(0.6246)	(0.0691)
	Loser	0.0005	0.0010	0.0012	0.0006	0.0042	-0.0015	0.0073	-0.0029
	p-value	(0.9552)	(0.8547)	(0.8820)	(0.9118)	(0.5928)	(0.7605)	(0.3580)	(0.5052)
12	Winner	0.0068	-0.0059	0.0057	-0.0068	0.0052	-0.0065	0.0027	-0.0081
	p-value	(0.1097)	(0.1366)	(0.1317)	(0.0527)	(0.1575)	(0.0511)	(0.4529)	(0.0135)
	W-L	0.0026	-0.0106	0.0008	-0.0110	-0.0027	-0.0065	-0.0083	-0.0088
	p-value	(0.7704)	(0.1184)	(0.9205)	(0.0835)	(0.7351)	(0.0511)	(0.2992)	(0.0857)

The momentum strategy based on 10 portfolios is intended to focus on the most extreme winner and loser stocks on the market. Results show that implementing a 10- portfolio momentum

strategy for G5 companies would yield similar momentum returns to those of the 5-portfolio momentum (again 14 out of 16 strategies yield positive momentum returns). The lowest (highest) momentum returns are -3.4% (11.3%). and are observed when implementing the 3 (9) on 3 (6) strategy. Likewise, the winner portfolios continue to win and the loser portfolios reverse. In particular, there is a strong continuation in the winning stock returns as the observation period increases and the holding period remains relatively short (3 to 6 months). Loser portfolios also reverse more strongly for longer observation and holding periods (see the 9 on 12 and 12 on 12 strategies). Positive returns on the momentum strategy are driven by the continuation of the winner portfolio. The loser's reversal reduces overall momentum returns. Even though the momentum strategy yields positive returns, regressing its returns on the three- and five-factor models yields slightly positive (7 out of 16) or slightly negative (9 out of 16) insignificant alphas. Momentum returns are explained by the Fama and French risk factors. Regressing the winner and loser portfolios individually, the winner portfolio generates positive significant alphas mainly for strategies 9 on 3 and 9 on 6, while the loser portfolio still produces negative and insignificant alphas. The highest 3 (5) FF alpha is observed when implementing the 9 on 3 strategy at 0.0079 (0.0093). Overall, the 10-portfolio sort generates higher winning portfolio gains and losing portfolio reversals compared to the 5- portfolio sort, and, thus, leads to no big differences in momentum returns between the two portfolio sorts.

Analyzing momentum returns among weak shareholder rights companies (G14) begins with the 5-portfolio strategy. 13 out of 16 momentum strategies yield positive returns. The highest return is (7.3%) exhibited when implementing a 9 on 6 strategy and the lowest (-2.5%) is exhibited for the 3 on 3 strategy. Similar to the G5 stocks, G14 winners continue to win but G14 losers exhibit strong reversals, which in turn reduces momentum returns significantly. Winner portfolios continue to win as the observation period increases without losing much of its strength when the holding period extends to 6, 9 and 12 months. Loser portfolio reversal goes slightly down (up) as the observation period increases and for holding periods of 3 (9) to 6 (12) months. Here also, momentum returns are driven by the strong continuation of the winner portfolio. However, they are much smaller in size due to strong reversal of the G14 losing stocks compared to the G5 losing stocks. Regressing momentum returns (of the G14 stocks and the 5-portfolio sort) on the three- and five-factor model, there are insignificant alphas across all observation/holding periods, with only the 12 on 12 strategy showing a negative significant alpha. In addition, winner portfolios exhibit positive significant alphas,

which are highest between observation/holding periods of 6 and 9 months. Loser portfolios, instead, yield (positive) insignificant alpha in all 16 strategies.

The 10-portfolio sort focuses on the most extreme winner and loser G14 stocks on the market. All 16 strategies generate negative returns. These negative momentum returns are driven by the strong reversal of the loser portfolio, offsetting any continuation of the winner portfolio. In some cases, such as the 3 on 3 and the 6 on 3 strategies, the losing portfolio (reversing) returns are more than twice the winner portfolio returns. The winning stock return continuation is not affected by the holding/observation period, while it is significantly smaller in size if compared to the returns of the G5 (strong shareholder right) winning stocks. The (extreme) losing stocks of the G14 category reverse strongly at short holding periods, with the effect asymmetrically going down as the observation and holding periods increase. Interestingly, G14 losing stocks reverse more strongly than the G5 losing portfolio for short holding periods (3 to 6 months), while the opposite is true for longer holding periods (9 to 12 months). It seems that investors sell more aggressively declining stocks with weak shareholder rights but they are reluctant and slow to sell losing stocks with strong shareholder rights. Even though the strong reversal in the loser portfolio offsets the continuation of the winner portfolio, the reversing returns are explained by the Fama-French risk factors as it generates (positive) insignificant alphas. Finally, regressing the winner portfolio returns on the risk factors generates significant and negative alphas in most cases. The risk factors overexplain the returns of the (extreme) winner portfolios among the weak shareholder rights companies. One explanation for this is that investors' buying pressure for extreme winners in the G14 category wears out quickly, or simply the same stocks are sold early due to fears of being way overvalued or not being able to recover their investment.

Overall, applying a 5- and 10-portfolio momentum strategy on companies with strong (G5) and weak (G14) shareholder rights produced some very interesting results. For the 5-portfolio sort, G5 stocks generate higher momentum returns than G14 due to the high reversing returns of G14 loser stocks. However, the winner portfolio of the G14 stocks produces higher returns and a positive significant alpha more often than the G5 winners do. For the 10-portfolio sort (extreme winners and losers), G5 stocks produce significantly higher momentum returns than G14 but it is the high continuing returns of the G5 winning stocks (compared to G14 winners) and the high reversing returns of the G14 losing stocks (compared to G5 losers) that causes this difference.

When looking at extreme winners and losers, past winning stocks with weak shareholder rights gain considerably less compared to winning stocks with strong shareholder rights and generate negative significant alphas. It seems that investors' buying pressure for extreme winners of the G14 category wears out quickly, or the same stocks are sold early due to fears of being overvalued or not being able to recover the investment (riskier). G14 losing stocks reverse more strongly than the G5 losing ones for short holding periods (3 to 6 months), while the opposite is true for longer holding periods (9 to 12 months). In particular, investors appear to sell more aggressively and quickly losing stocks with weak shareholder rights, but they are reluctant and slow to sell losing stocks with strong shareholder rights.

3.5.2.3 The effect of shareholder rights vs. risk

Momentum returns decrease when moving from strong shareholders rights companies G5 (Democracy) to weak shareholders rights companies G14 (Dictatorship). This difference is more pronounced when considering the extreme winner and losers (10-portfolio sort). In particular, the losing stocks in the G14 category earn significantly higher (reversing) returns than the G5 losing stocks on the 5-portfolio sort, while the G14 winning stocks earn significantly lower returns than the G5 winning ones on the 10-portfolio sort. It is worth noting also that investors are reluctant to bid up (extreme) winning stocks with weak shareholder rights across all observation and holding periods. On the losing side, investors seem to be selling aggressively their (extreme) losing stocks with weak shareholder rights, thus generating high reversals at short holding periods (3 to 6 months) and across all observation periods. Interestingly, results point towards longer continuation return cycles on the winning side and quicker reversing returns on the losing side.

In the 5-portfolio sort, regressing winners (of weak and strong shareholder rights) on the three- and five-factor models produces mainly positive significant alphas, with G14 winners producing higher and more often significant alphas compared to G5 winners. G5 and G14 winners have similar exposure to the market (close to 1 on average) and size (close to 0.60 on average) factors and no exposure to the value factor. G5 winners do not load on the profitability and investment factors, while G14 winners load negatively and significantly only on the profitability factor. On the winning side, investors buying up G14 winners seem to prefer those with weak rather than robust profitability.

Although the exposure of G5 and G14 winners to market and size risk is similar, when tested against the three-factor model, G14 stocks are more frequently mispriced and, therefore,

corporate governance (or shareholder rights as a characteristic) is a candidate for explaining excess returns.[26] Regressing the reversing returns of the losing portfolios on the three and five-factor models generates insignificant alphas for both G5 and G14 stocks. Exposure to market and value factors are similar among the two stock categories. However, losing stocks of the G5 category load significantly more on the size and investment factors compared to losing stocks of the G14 category. Again, losing stocks with weak shareholder rights load negatively and significantly on the profitability factor. So, on the losing side, investors seem to offload more aggressively G5 stocks of small size and low investment, and G14 stocks of low profitability.

In the 10-portfolio sort, the reversal of the loser portfolio is not bigger than the continuation of the winner in the G5 companies, producing positive momentum returns for the same stocks. However, the reversal of the G14 losers is greater than the continuation of the G14 winners, generating negative momentum returns. Regressing momentum returns on the risk factors gives positive (negative) insignificant (significant) alphas for strong (weak) shareholder rights companies (see table 3.8). When regressing G5 and G14 winners on the risk factors separately, there are mainly positive insignificant alphas for G5 stocks and negative significant alphas for the G14 stocks. Further, G5 and G14 winning stocks have similar exposure to the market factor (slightly above one on average), but G5 winners have higher exposure to the size factor compared to G14 winners. Winning stocks with weak shareholder rights (G14) also load positively and significantly on the value and profitability factors.

On the winning side, investors seem to choose small stocks among the G5 category, while their choice among G14 stocks seems to be focused on value and profitability (results unreported). If investing in extreme G14 winners is more risky (due to weak shareholder rights), then investors seem to be hedging against this risk by choosing stocks with high profitability and book-to-market ratio. Looking now at the reversing returns of G5 and G14 losing portfolios, G5 stocks have a significantly higher (positive) exposure to market, size and investment factors compared to G14 stocks.[27] On the losing side, investors appear to be selling G5 stocks of small size, low investment, and that significantly overperform the market index. However, when it

[26] Again, companies with weak shareholder rights or corporate governance structure (G14) are possibly riskier in terms of investment recovery and less transparent in terms of information disclosure. Thus, investors might be more (less) reluctant to buy (sell) G14 winners (losers) when further good (bad) news arrives in the market, which lead to mispricing (significant negative/positive alphas).

[27] For example, in some cases the G5 losing stock loadings on the size and investment factors are more than twice the loadings of G14 losing stocks.

comes to the extreme losing stocks in the G14 category, their reversing returns load positively and significantly, though mildly, on the market, size, value, and investment factors. The high reversing returns of the G14 category compared to G5 means that investors disproportionally (and more aggressively) sell G14 stocks compared to G5, while their risk factor exposure indicates that they do not pay any extra attention to commonly known characteristics, such as size, value, or investment.[28]

In summary, a momentum strategy applied on all stocks with a corporate governance score generates positive returns from 1990 to 1999, but these returns are mainly explained by the Fama-French risk factors. A momentum strategy applied separately to stocks with weak and strong shareholders rights produces results that are more interesting. First, companies with strong shareholders rights (G5) generate positive (and insignificant) momentum (excess) returns. G5 winners continue to win and produce significant positive alphas mainly at intermediate horizons (for both 5- and 10-portfolio sort). Also, G5 winners load positively and significantly only on the market and size factors. G5 losers reverse over the holding period but their alphas are insignificant. In terms of risk factor exposure, the G5 reversing returns load strongly on the size and investment factors. It is worth noting here that investors on the winning side choose G5 stocks of small size, while, on the losing side, they oversell stocks of small size and low investment. Second, companies with weak shareholders rights (G14) generate positive and negative (insignificant) momentum excess returns. G14 winners continue to win and produce significant positive alphas more often at intermediate horizons (for both the 5- and 10-portfolio sort). Also, G14 winners load positively and significantly on the market, size, value, and profitability factors. G14 losers reverse over the holding period, but their alphas are insignificant. Further, the G14 reversing returns do not overload on the market, size, value, and investment factors, although the effects are positive and significant. It is important that investors on the winning side choose G14 stocks of value (high book-to-market ratio) and profitability, while, on the losing side, they do not seem to oversell stocks with a particular risk

[28] Importantly, loser stock reversing returns on the 10-portfolio sort depend on the length of the holding period. At short holding periods (3 to 6 months) G14 loser portfolios generate higher (reversing) returns than G5 loser ones but the opposite is true at longer periods (9 to 12 months). So, G5 losers reverse at in increasing rate with the holding period, while G14 losers reverse at a decreasing rate with the holding period. This is probably due to the fact that investors sell more aggressively G14 stocks compared to G5 ones when bad news arrives, while they are also more reluctant to add G5 stocks back to their portfolio, thinking that the recent decline in prices reflects a lasting rather than transitory decline in fundamentals. Holding losing stocks with weak shareholder rights is possibly riskier (lack of transparency and ambiguity over recovering investment) and, therefore, investors may oversell these stocks on a downtrend and overreact on the reversal. This reversal fades as investors become more rational.

characteristic. Finally, despite the exposures of G5 and G14 winners to market and size risk being similar, when tested against the three-factor model, G14 stocks are more frequently mispriced. Therefore, corporate governance (or shareholder rights as a characteristic) is a candidate for explaining excess returns. Last but not least, the high reversing returns of the G14 category compared to G5 means that investors disproportionally and aggressively sell G14 stocks compared to G5, while their risk factor exposure indicates that they do not pay any extra attention to commonly known characteristics, such as size, value, or investment.

The results here are consistent with the existing literature where a portfolio of stocks with strong shareholder rights would earn higher returns compared to a portfolio of stocks with weak shareholder rights (Gompers, Ishii and Metrick, 2003). This is mainly caused by the higher return earned by the G5 winner stocks compared to the G14 winners' stocks. Although a higher return (reversal) is earned by the loser stocks on the G14 compared to the G5, a significantly lower return is earned by the winner stocks in G14 compared to G5. Given that the loser stocks always reverse, a momentum strategy would produce significantly lower returns than an investment strategy that buys both the winner and loser stocks.

3.5.3 Recession period (2000–2004)

3.5.3.1 Market momentum

Establishing the relationship between a company's shareholders right and momentum strategy requires testing in different market states. The previous section analyzed an expansion period, and this section repeats the analysis while focusing on the recession period from January of 2000 to December of 2003. The results for the 5-portfolio sort show that all 16 different strategies exhibit negative momentum returns. Momentum decreases further when looking at longer periods. The lowest momentum is for the 12 on 6 strategy, yielding a negative 13% annual return. The highest momentum comes from the 3 on 3 strategy at -3%. Separating out the winner and loser portfolios, the loser portfolio always reverses. The reversal increases as the observation period increases, indicating that the losing stocks experienced increased selling pressure over the same period.

Table 3.9
Cross-sectional market momentum (2000–2004)

Cross-sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over *J* months in ascending order. 5 equally weighted portfolios (panel A) and 10 equally weighted portfolios (panel B) are formed based on the past *J* months of performance. P1 is the loser portfolio and P5/P10 is the winner portfolio. Stocks with the most returns over the observation period *J* months (P5/P10) are bought and stocks with the lowest performance over *J* months are sold (P1). Average monthly returns are presented in this table. The sample period is January 2000 to December 2003.

		Panel A				**Panel B**			
		Momentum 5 portfolios				**Momentum 10 portfolios**			
J	**K**	3	6	9	12	3	6	9	12
3	Loser	0.0194	0.0223	0.023	0.0221	0.025	0.028	0.029	0.028
	Winner	0.017	0.0167	0.015	0.0152	0.02	0.02	0.017	0.017
	W-L	-0.0024	-0.0056	-0.008	-0.0069	-0.0044	-0.0089	-0.012	-0.0104
	Annual	-3.00%	-7.00%	-9.00%	-8.00%	-5.20%	-10.10%	-13.40%	-11.80%
6	Loser	0.0238	0.0253	0.0239	0.0231	0.03	0.033	0.031	0.029
	Winner	0.016	0.016	0.0149	0.0145	0.018	0.018	0.016	0.016
	W-L	-0.0078	-0.0093	-0.009	-0.0086	-0.0118	-0.0153	-0.0152	-0.0135
	Annual	-9.00%	-11.00%	-10.00%	-10.00%	-13.30%	-16.90%	-16.80%	-15.00%
9	Loser	0.0244	0.0253	0.0236	0.0227	0.033	0.033	0.031	0.029
	Winner	0.0164	0.0149	0.0139	0.0137	0.018	0.016	0.014	0.014
	W-L	-0.008	-0.0105	-0.0097	-0.009	-0.0141	-0.0172	-0.017	-0.015
	Annual	-9.00%	-12.00%	-11.00%	-10.00%	-15.70%	-18.80%	-18.60%	-16.60%
12	Loser	0.0237	0.0246	0.0233	0.0222	0.03	0.032	0.03	0.029
	Winner	0.0134	0.0128	0.0124	0.013	0.013	0.012	0.012	0.013
	W-L	-0.0103	-0.0118	-0.0109	-0.0093	-0.0168	-0.0198	-0.0182	-0.0157
	Annual	-12.00%	-13.00%	-12.00%	-11.00%	-18.40%	-21.30%	-19.80%	-17.30%

It seems that bad news about losing stocks, especially during recessionary (or low sentiment) periods, amplifies their sale, leading to mispricing of the stocks. The mispricing is corrected eventually during the holding period. Winner portfolios, on the other hand, continue to win but their returns decrease as the observation/holding period increases. Good news for winning stocks diffuses slowly during a recessionary period (cognitive dissonance effect), while the gradual decline in the buying pressure during the holding period is consistent with a delayed price reaction.

During recessionary periods, winner stocks continue to win at a decreasing rate as the observation/holding period increases and the loser stocks reverse at an increasing rate as the observation period increases. In other words, among losing stocks a significant selling pressure seems to be prevalent during the formation period, which turns into a buying pressure during the holding period. Among winners, the buying pressure gradually declines over the holding period, while the buying (selling) pressure increases (declines) over the formation period.

Table 3.10
Regression analysis of market momentum (2000–2004)

Momentum, winner, and loser portfolios are regressed on the three-factor (panels A and C) and five-factor (panels B and D) Fama and French models, with alphas reported. Analysis is performed separately for companies with strong shareholders rights (G5) and weak shareholders rights (G14). Winners and losers are based on a 5-portfolio split (panels A and B) or 10-portfolio split (panels C and D). The sample window is form January 2000 to December 2003.

		Panel A				**Panel B**			
		3 FF 5 portfolios				**5 FF 5 portfolios**			
J		3	6	9	12	3	6	9	12
3	Loser	0.0133	0.0154	0.0152	0.0129	0.0106	0.0120	0.0132	0.0120
	p-value	(0.2086)	(0.1276)	(0.1063)	(0.0729)	(0.3295)	(0.2064)	(0.1236)	(0.0480)
	Winner	0.0026	0.0025	0.0016	0.0025	0.0027	0.0025	0.0004	0.0008
	p-value	(0.4938)	(0.5053)	(0.5284)	(0.2255)	(0.5427)	(0.5827)	(0.8782)	(0.7071)
	W-L	-0.0118	-0.0140	-0.0147	-0.0115	-0.0090	-0.0106	-0.0139	-0.0123
	p-value	(0.3565)	(0.2425)	(0.1509)	(0.1004)	(0.5322)	(0.4019)	(0.1806)	(0.0593)
6	Loser	0.0185	0.0181	0.0151	0.0136	0.0147	0.0164	0.0149	0.0144
	p-value	(0.1704)	(0.1071)	(0.0426)	(0.0679)	(0.2413)	(0.1019)	(0.0839)	(0.0152)
	Winner	0.0019	0.0019	-0.0001	0.0018	0.0024	0.0009	0.0019	-0.0003
	p-value	(0.7032)	(0.6341)	(0.9573)	(0.3325)	(0.6887)	(0.8448)	(0.4216)	(0.8869)
	W-L	-0.0177	-0.0174	-0.0163	-0.0129	-0.0134	-0.0166	-0.0142	-0.0158
	p-value	(0.3087)	(0.2106)	(0.0638)	(0.1087)	(0.4504)	(0.2260)	(0.1382)	(0.0155)
9	Loser	0.0170	0.0161	0.0137	0.0128	0.0174	0.0177	0.0164	0.0154
	p-value	(0.1584)	(0.0727)	(0.0826)	(0.0664)	(0.1154)	(0.0253)	(0.0129)	(0.0079)
	Winner	0.0023	0.0016	0.0012	0.0012	0.0003	-0.0007	-0.0014	-0.0012
	p-value	(0.6223)	(0.5808)	(0.6011)	(0.5333)	(0.9605)	(0.8352)	(0.5160)	(0.4823)
	W-L	-0.0159	-0.0156	-0.0137	-0.0128	-0.0182	-0.0194	-0.0189	-0.0177
	p-value	(0.3138)	(0.1547)	(0.1337)	(0.1055)	(0.2442)	(0.0576)	(0.0129)	(0.0047)
12	Loser	0.0139	0.0144	0.0132	0.0122	0.0171	0.0180	0.0167	0.0153
	p-value	(0.1268)	(0.0776)	(0.0678)	(0.0722)	(0.0370)	(0.0083)	(0.0064)	(0.0084)
	Winner	0.0008	0.0004	0.0001	0.0008	-0.0018	-0.0021	-0.0024	-0.0014
	p-value	(0.8149)	(0.8604)	(0.9527)	(0.6642)	(0.6231)	(0.3452)	(0.1716)	(0.3792)
	W-L	-0.0143	-0.0151	-0.0143	-0.0125	-0.0200	-0.0211	-0.0202	-0.0178
	p-value	(0.2281)	(0.1234)	(0.0871)	(0.1016)	(0.0670)	(0.0076)	(0.0018)	(0.0024)

		Panel C 3 FF 10 portfolios				Panel D 5 FF 10 portfolios			
J		3	6	9	12	3	6	9	12
3	Loser	0.0218	0.0232	0.0225	0.0193	0.0216	0.0219	0.0229	0.0207
	p-value	(0.1246)	(0.0936)	(0.0872)	(0.0543)	(0.1418)	(0.0957)	(0.0588)	(0.0165)
	Winner	0.0054	0.0043	0.0025	0.0034	0.0064	0.0050	0.0015	0.0016
	p-value	(0.3063)	(0.3865)	(0.4512)	(0.2101)	(0.2828)	(0.3841)	(0.6846)	(0.5666)
	W-L	-0.0175	-0.0200	-0.0212	-0.0169	-0.0164	-0.0180	-0.0225	-0.0202
	p-value	(0.2893)	(0.2073)	(0.1284)	(0.0743)	(0.3823)	(0.2870)	(0.1108)	(0.0256)
6	Loser	0.0276	0.0278	0.0236	0.0211	0.0272	0.0294	0.0269	0.0251
	p-value	(0.1456)	(0.0739)	(0.0577)	(0.0473)	(0.1368)	(0.0407)	(0.0154)	(0.0048)
	Winner	0.0025	0.0017	0.0012	0.0017	0.0040	0.0012	-0.0003	-0.0001
	p-value	(0.7217)	(0.7593)	(0.6848)	(0.4675)	(0.6423)	(0.8497)	(0.9304)	(0.9705)
	W-L	-0.0262	-0.0273	-0.0236	-0.0206	-0.0243	-0.0293	-0.0283	-0.0263
	p-value	(0.2761)	(0.1482)	(0.0829)	(0.0697)	(0.3367)	(0.1310)	(0.0302)	(0.0080)
9	Loser	0.0271	0.0252	0.0230	0.0208	0.0316	0.0313	0.0298	0.0271
	p-value	(0.1231)	(0.0565)	(0.0530)	(0.0439)	(0.0529)	(0.0078)	(0.0037)	(0.0021)
	Winner	0.0020	0.0004	-0.0001	0.0000	0.0004	-0.0016	-0.0024	-0.0020
	p-value	(0.7482)	(0.9146)	(0.9660)	(0.9972)	(0.9537)	(0.7111)	(0.3853)	(0.3348)
	W-L	-0.0262	-0.0259	-0.0243	-0.0220	-0.0323	-0.0340	-0.0334	-0.0302
	p-value	(0.2351)	(0.0959)	(0.0670)	(0.0541)	(0.1461)	(0.0205)	(0.0039)	(0.0015)
12	Loser	0.0211	0.0218	0.0221	0.0211	0.0280	0.0216	0.0300	0.0280
	p-value	(0.0489)	(0.1246)	(0.0520)	(0.0489)	(0.0029)	(0.1418)	(0.0026)	(0.0029)
	Winner	-0.0004	0.0054	-0.0017	-0.0004	-0.0022	0.0064	-0.0035	-0.0022
	p-value	(0.8552)	(0.3063)	(0.4716)	(0.8552)	(0.3253)	(0.2828)	(0.1431)	(0.3253)
	W-L	-0.0227	-0.0175	-0.0250	-0.0227	-0.0313	-0.0164	-0.0346	-0.0313
	p-value	(0.0548)	(0.2893)	(0.0482)	(0.0548)	(0.0015)	(0.3823)	(0.0012)	(0.0015)

When regressed on the three-factor model, winner portfolio returns are explained by risk factors (see the positive insignificant alphas in table 3.9, panel A). The loser portfolio returns, however, produce positive significant alphas in 9 out of the 16 strategies in the three-factor model (at 10% significance level). There are positive significant alphas for the longer observation and holding periods. For example, the 9 on 6 strategy produces the highest monthly alpha of 0.0161. Table 3.10, panel B shows the alphas from regressing momentum winner and loser returns on the five-factor model. Loser portfolio returns produce a positive significant alpha in 9 (10) out of 16 strategies at the 5% (10%) significance level. All winner portfolio strategies have insignificant alphas during the recessionary period. Momentum returns (winner-loser) show a significant negative alpha in 9 out of the 16 strategies.

Given that momentum returns are usually stronger for extreme winning and losing stocks, the next analysis examines the 10-portfolio sort. Panel B of table 9 shows that all momentum

strategies generate negative returns that are far more negative than in the 5- portfolio sort. The highest negative momentum returns of -21.3% is for the 12 on 6 strategy. Looking separately at winner and loser stocks, loser stocks reverse strongly as the observation period increases, while winners continue to win at a decreasing rate as the observation/holding period increases. Since the losers' reversal is greater than the winners' continuation, there are negative momentum returns. Similar to the 5-portfolio sort (and even stronger here), among losing stocks a significant selling pressure is dominant during the formation period, which turns into a buying pressure during the holding period.

Table 3.10, panels C and D show alphas from regressing (the 10-portfolio sort) momentum returns on the three- and five-factor model. Momentum portfolios returns generate negative alphas when regressed on the three- and five-factor models. 9 out of 16 of these negative alphas are significant (10% significance level). Winners generate positive insignificant alphas across all strategies. Losers, on the other hand, generate positive significant alphas in 12 out of 16 different observation and holding periods. The positive significant alphas indicate that the loser returns cannot be explained by the risk factors alone. In a down-trending market, further bad news on losing stocks puts extra selling pressure during the formation period, which turns into a buying pressure and there is a strong reversal during the holding period. Overall, implementing a momentum strategy during a recession period generates negative returns, which are mainly driven by the strongly reversing returns of the loser portfolio and weak continuing returns of the winner portfolio.

3.5.3.2 Corporate governance momentum

Continuing with the recessionary period, analysis now focuses on companies with strong shareholders rights (G5), democracy companies. A 5- and 10-portfolio partition is applied within the sample of G5 companies. On the 5-portfolio sort, there are positive momentum returns on all 16 different strategies (see table 3.11, panel A). The biggest momentum returns are for the 12 on 3 strategy, with a 16% annual return. Looking at winners and losers separately, winner portfolios continue to win but at a decreasing rate as the observation and holding periods increase. Loser portfolios show reversing returns that also decrease at longer observation/holding periods. Since the winner continuation is greater than the loser reversal, there are positive momentum returns. Regressing the G5 stock momentum returns on the Fama-French factors produces insignificant alphas in all cases (table 12, panel A). Winner and loser portfolios also generate positive insignificant alphas (only the 3 on 12 strategy winners produce

a positive significant alpha at the 10% significance level). The same results hold true when regressing momentum, loser and winner portfolio returns on the five-factor model (table 3.10, panel B).

Table 3.11
Cross-sectional corporate governance momentum (2000–2004)

Cross-sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over J months in ascending order. 5 equally weighted portfolios (panel A) and 10 equally weighted portfolios (panel B) are formed based on the past *J* months of performance. P1 is the loser portfolio and P5/P10 is the winner portfolio. Stocks with the most returns over the observation period J months (P5/P10) are bought and stocks with the lowest performance over *J* months are sold (P1). Average monthly returns are presented in this table. The sample period is January 2000 to December 2003.

Panel A

Momentum 5 portfolios

J		3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0165	0.0242	0.0163	0.0277	0.0158	0.0286	0.0131	0.0283
	Winner	0.0200	0.0188	0.0201	0.0191	0.0186	0.0186	0.0191	0.0169
	W-L	0.0035	-0.0054	0.0037	-0.0086	0.0028	-0.0099	0.0060	-0.0114
	Annual	0.0400	-0.0600	0.0500	-0.1000	0.0300	-0.1100	0.0700	-0.1300
6	Loser	0.0167	0.0286	0.0147	0.0331	0.0125	0.0326	0.0129	0.0312
	Winner	0.0207	0.0189	0.0219	0.0195	0.0195	0.0176	0.0170	0.0162
	W-L	0.0040	-0.0097	0.0072	-0.0136	0.0071	-0.0151	0.0040	-0.0150
	Annual	0.0500	-0.1100	0.0900	-0.1500	0.0900	-0.1700	0.0500	-0.1700
9	Loser	0.0182	0.0336	0.0126	0.0362	0.0132	0.0340	0.0143	0.0305
	Winner	0.0227	0.0194	0.0212	0.0170	0.0170	0.0153	0.0165	0.0150
	W-L	0.0045	-0.0141	0.0087	-0.0192	0.0038	-0.0187	0.0022	-0.0155
	Annual	0.0500	-0.1600	0.1100	-0.2100	0.0500	-0.2000	0.0300	-0.1700
12	Loser	0.0101	0.0343	0.0122	0.0355	0.0141	0.0330	0.0154	0.0290
	Winner	0.0225	0.0150	0.0182	0.0143	0.0164	0.0142	0.0161	0.0142
	W-L	0.0124	-0.0193	0.0059	-0.0212	0.0023	-0.0188	0.0008	-0.0148
	Annual	0.1600	-0.2100	0.0700	-0.2300	0.0300	-0.2000	0.0100	-0.1600

Panel B

Momentum 10 portfolios

J		3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0210	0.0280	0.0200	0.0280	0.0180	0.0260	0.0140	0.0240
	Winner	0.0240	0.0240	0.0230	0.0220	0.0220	0.0250	0.0220	0.0180
	W-L	0.0031	-0.0046	0.0035	-0.0064	0.0039	-0.0016	0.0077	-0.0060
	Annual	0.0380	-0.0540	0.0430	-0.0740	0.0480	-0.0190	0.0970	-0.0700
6	Loser	0.0230	0.0330	0.0190	0.0330	0.0170	0.0290	0.0190	0.0270
	Winner	0.0260	0.0120	0.0290	0.0140	0.0250	0.0130	0.0220	0.0130
	W-L	0.0034	-0.0215	0.0097	-0.0193	0.0074	-0.0152	0.0032	-0.0135
	Annual	0.0410	-0.2290	0.1220	-0.2090	0.0930	-0.1680	0.0390	-0.1500
9	Loser	0.0180	0.0380	0.0160	0.0370	0.0190	0.0300	0.0200	0.0270
	Winner	0.0330	0.0220	0.0270	0.0160	0.0210	0.0150	0.0210	0.0120
	W-L	0.0147	-0.0163	0.0110	-0.0207	0.0021	-0.0150	0.0007	-0.0151
	Annual	0.1910	-0.1790	0.1400	-0.2220	0.0250	-0.1660	0.0080	-0.1670

12	Loser	0.0200	0.0370	0.0220	0.0390	0.0210	0.0320	0.0250	0.0270
	Winner	0.0260	0.0150	0.0210	0.0120	0.0200	0.0100	0.0190	0.0090
	W-L	0.0067	-0.0218	-0.0017	-0.0264	-0.0014	-0.0214	-0.0057	-0.0184
	Annual	0.0840	-0.2330	-0.0200	-0.2740	-0.0160	-0.2280	-0.0660	-0.2000

In the 10-portfolio sort, momentum returns for G5 companies are mainly positive and larger than for the 5-portfolio sort (see table 3.11, panel B). Momentum returns peak for the 9 on 3 strategy with a 19.1% annual return but they also reach negative values for 12 on 6, 12 on 9, and 12 on 12 strategies. Similar to the 5-portolio sort, the loser portfolio returns reverse at a diminishing rate as observation/holding periods increase, while the winner portfolios show continuation in returns that also decrease at longer periods. The 10-portfolio sort for stocks with strong shareholder rights (G5) produces higher reversing (continuing) returns for loser (winner) stocks than the 5-portfolio sort. However, at longer observation/holding periods such as 12 on 6, 12 on 9, and 12 on 12, the loser portfolio produces reversing returns higher than the continuing ones of the winner portfolio, resulting in negative momentum returns. Running a regression of the (10-portfolio sort) winner and loser portfolio returns on the three-factor model generates largely positive insignificant alphas with only three exceptions for the winner portfolio (at the 10% significance level). Momentum returns, on the other hand, either have very small negative or very small positive alphas with no significance at all (table 3.12, panel C). When regressed on the five-factor model, momentum returns largely have negative insignificant alphas. Only the 12 on 12 strategy is significant (table 3.12, panel D). Winner portfolios have positive insignificant alphas (only the 6 on 6 strategy is positive and significant at 10%), while loser portfolios have positive significant alphas in 7 out of 16 different strategies (at the 10% significance level).[29] The strong reversing returns of the extreme G5 losing stocks cannot be explained by the market, size, value, profitability, and investment factors for nearly half of the strategies.

The analysis now looks at weak shareholder rights companies (G14) to investigate if their portfolio returns have similar characteristics to the strong shareholders right companies (G5) during the recessionary period. Table 3.11, panel A shows the results from the 5-portfolio partition. Momentum returns are highly negative for weak shareholders rights companies. In particular, momentum for G14 companies ranges from -6% to -23% annual returns. Loser portfolios always reverse, and their reversal increases as the observation/holding period

[29] Another four strategies produce positive significant alphas for the losing stocks if the significance level is increased to 10%.

increases. Winner portfolios, on the other hand, continue to win but at a decreasing rate. Given that the loser portfolio generates large reversing returns during the holding period, and the winner portfolio generates weak continuing returns, the momentum returns are justifiably negative.

Table 3.12

Regression analysis of cross-sectional corporate governance momentum

Cross-sectional momentum is formed based on an observation period of *J* months and a holding period of *K* months. Stocks are ranked based on their past performance over *J* months in ascending order. 5 equally weighted portfolios (panels A and B) and 10 equally weighted portfolios (panels C and D) are formed based on the past *J* months of performance. P1 is the loser portfolio and P5/P10 is the winner portfolio. Stocks with the most returns over the observation period *J* months (P5/P10) are bought and stocks with the lowest performance over *J* months are sold (P1). Momentum, winner, and loser returns are regressed on the three-factor (panels A and C) and five-factor (panels B and D) Fama and French models. The sample period is January 2000 to December 2003.

Panel A

3 FF 5 portfolios

J	**K**	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0059	0.0214	0.0061	0.0223	0.0056	0.0223	0.0026	0.0199
	p-value	(0.6514)	(0.1227)	(0.5766)	(0.0950)	(0.5917)	(0.0806)	(0.7733)	(0.0339)
	Winner	0.0044	0.0034	0.0050	0.0035	0.0040	0.0037	0.0054	0.0026
	p-value	(0.5545)	(0.5311)	(0.3510)	(0.5152)	(0.2570)	(0.2913)	(0.0909)	(0.3482)
	W-L	-0.0027	-0.0192	-0.0022	-0.0199	-0.0027	-0.0197	0.0017	-0.0184
	p-value	(0.8786)	(0.2008)	(0.8633)	(0.1783)	(0.8105)	(0.1255)	(0.8491)	(0.0413)
6	Loser	0.0089	0.0242	0.0055	0.0263	0.0022	0.0228	0.0034	0.0212
	p-value	(0.5457)	(0.1855)	(0.6702)	(0.0723)	(0.8558)	(0.0396)	(0.7741)	(0.0159)
	Winner	0.0054	0.0040	0.0067	0.0041	0.0052	0.0031	0.0032	0.0020
	p-value	(0.4541)	(0.5917)	(0.1556)	(0.4699)	(0.1164)	(0.3550)	(0.3258)	(0.5019)
	W-L	-0.0046	-0.0213	0.0001	-0.0233	0.0019	-0.0208	-0.0013	-0.0203
	p-value	(0.8144)	(0.3411)	(0.9958)	(0.1763)	(0.8923)	(0.0891)	(0.9218)	(0.0377)
9	Loser	0.0105	0.0266	0.0037	0.0270	0.0042	0.0235	0.0055	0.0202
	p-value	(0.4827)	(0.0791)	(0.7856)	(0.0103)	(0.7584)	(0.0089)	(0.6751)	(0.0051)
	Winner	0.0074	0.0042	0.0064	0.0027	0.0027	0.0015	0.0026	0.0015
	p-value	(0.3269)	(0.4648)	(0.1723)	(0.5079)	(0.4916)	(0.6538)	(0.4620)	(0.6282)
	W-L	-0.0042	-0.0235	0.0016	-0.0254	-0.0027	-0.0231	-0.0041	-0.0198
	p-value	(0.8263)	(0.2154)	(0.9218)	(0.0406)	(0.8636)	(0.0265)	(0.7814)	(0.0192)
12	Loser	0.0011	0.0234	0.0036	0.0247	0.0053	0.0222	0.0068	0.0186
	p-value	(0.9447)	(0.0158)	(0.8165)	(0.0059)	(0.7209)	(0.0048)	(0.6262)	(0.0086)
	Winner	0.0102	0.0015	0.0051	0.0011	0.0032	0.0012	0.0027	0.0015
	p-value	(0.1448)	(0.7157)	(0.2577)	(0.7682)	(0.3948)	(0.7413)	(0.4278)	(0.6724)
	W-L	0.0079	-0.0230	0.0003	-0.0247	-0.0032	-0.0221	-0.0052	-0.0182
	p-value	(0.6905)	(0.0520)	(0.9858)	(0.0159)	(0.8419)	(0.0126)	(0.7329)	(0.0228)

Panel B

5 FF 5 portfolios									
J	**K**	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0088	0.0171	0.0119	0.0164	0.0127	0.0193	0.0095	0.0181
	p-value	(0.4764)	(0.2439)	(0.2434)	(0.1864)	(0.1833)	(0.1090)	(0.2267)	(0.0401)
	Winner	0.0086	0.0043	0.0072	0.0029	0.0041	0.0023	0.0040	0.0011
	p-value	(0.3301)	(0.4329)	(0.2507)	(0.6339)	(0.3185)	(0.5617)	(0.2454)	(0.7196)
	W-L	-0.0014	-0.0139	-0.0058	-0.0146	-0.0097	-0.0181	-0.0066	-0.0181
	p-value	(0.9405)	(0.4189)	(0.6739)	(0.3539)	(0.3905)	(0.1682)	(0.4272)	(0.0433)
6	Loser	0.0171	0.0183	0.0151	0.0233	0.0131	0.0230	0.0135	0.0228
	p-value	(0.2490)	(0.2726)	(0.2290)	(0.0728)	(0.2360)	(0.0287)	(0.1945)	(0.0071)
	Winner	0.0081	0.0048	0.0071	0.0030	0.0042	0.0015	0.0020	-0.0004
	p-value	(0.3376)	(0.5854)	(0.2027)	(0.6509)	(0.2806)	(0.7066)	(0.5979)	(0.8969)
	W-L	-0.0102	-0.0146	-0.0091	-0.0213	-0.0100	-0.0226	-0.0126	-0.0243
	p-value	(0.6220)	(0.5346)	(0.5700)	(0.2234)	(0.4423)	(0.0621)	(0.3081)	(0.0084)
9	Loser	0.0209	0.0277	0.0165	0.0301	0.0175	0.0289	0.0175	0.0258
	p-value	(0.1553)	(0.0491)	(0.1777)	(0.0033)	(0.1473)	(0.0019)	(0.1255)	(0.0010)
	Winner	0.0083	0.0022	0.0065	0.0001	0.0023	-0.0015	0.0024	-0.0014
	p-value	(0.3460)	(0.7425)	(0.2418)	(0.9758)	(0.6085)	(0.6628)	(0.5685)	(0.6255)
	W-L	-0.0137	-0.0266	-0.0111	-0.0310	-0.0163	-0.0315	-0.0162	-0.0283
	p-value	(0.4987)	(0.1560)	(0.4692)	(0.0104)	(0.2563)	(0.0016)	(0.2135)	(0.0006)
12	Loser	0.0156	0.0287	0.0189	0.0307	0.0197	0.0297	0.0190	0.0255
	p-value	(0.2737)	(0.0081)	(0.1594)	(0.0016)	(0.1183)	(0.0008)	(0.1096)	(0.0015)
	Winner	0.0097	0.0000	0.0048	-0.0010	0.0027	-0.0015	0.0023	-0.0018
	p-value	(0.2287)	(0.9993)	(0.3544)	(0.7782)	(0.5326)	(0.6419)	(0.5573)	(0.5065)
	W-L	-0.0070	-0.0298	-0.0151	-0.0328	-0.0182	-0.0324	-0.0178	-0.0284
	p-value	(0.6989)	(0.0188)	(0.3234)	(0.0009)	(0.1945)	(0.0002)	(0.1700)	(0.0004)

Panel C

3 FF 10 portfolios									
J	**K**	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0128	0.0149	0.0102	0.0137	0.0080	0.0125	0.0045	0.0097
	p-value	(0.4959)	(0.2954)	(0.5314)	(0.2385)	(0.5990)	(0.2397)	(0.7407)	(0.3393)
	Winner	0.0080	0.0096	0.0062	0.0089	0.0052	0.0107	0.0063	0.0047
	p-value	(0.5147)	(0.4185)	(0.4056)	(0.4287)	(0.3195)	(0.2570)	(0.1682)	(0.4902)
	W-L	-0.0059	-0.0064	-0.0051	-0.0059	-0.0040	-0.0029	0.0007	-0.0062
	p-value	(0.8116)	(0.6812)	(0.7875)	(0.5894)	(0.8079)	(0.7373)	(0.9600)	(0.3706)
6	Loser	0.0167	0.0189	0.0112	0.0175	0.0077	0.0129	0.0109	0.0105
	p-value	(0.4046)	(0.1853)	(0.5458)	(0.1671)	(0.6659)	(0.2738)	(0.5260)	(0.3664)
	Winner	0.0092	0.0028	0.0106	0.0027	0.0079	0.0005	0.0058	-0.0002
	p-value	(0.3300)	(0.8415)	(0.0698)	(0.8041)	(0.0816)	(0.9539)	(0.1984)	(0.9808)
	W-L	-0.0087	-0.0171	-0.0018	-0.0159	-0.0010	-0.0135	-0.0062	-0.0118
	p-value	(0.7358)	(0.3042)	(0.9336)	(0.2329)	(0.9614)	(0.1996)	(0.7497)	(0.2012)
9	Loser	0.0104	0.0217	0.0077	0.0193	0.0111	0.0133	0.0128	0.0112
	p-value	(0.6421)	(0.1475)	(0.7169)	(0.1863)	(0.5934)	(0.3537)	(0.5028)	(0.4290)

	Winner	0.0169	0.0086	0.0113	0.0029	0.0056	0.0017	0.0056	-0.0023
	p-value	(0.1038)	(0.3686)	(0.0857)	(0.7036)	(0.2995)	(0.8047)	(0.2647)	(0.6687)
	W-L	0.0054	-0.0142	0.0025	-0.0176	-0.0066	-0.0127	-0.0083	-0.0146
	p-value	(0.8428)	(0.2758)	(0.9179)	(0.1695)	(0.7747)	(0.3060)	(0.6958)	(0.2787)
12	Loser	0.0156	0.0205	0.0171	0.0232	0.0148	0.0179	0.0190	0.0152
	p-value	(0.5044)	(0.2477)	(0.4524)	(0.1762)	(0.4921)	(0.2930)	(0.3420)	(0.4371)
	Winner	0.0116	0.0014	0.0057	-0.0009	0.0043	-0.0027	0.0038	-0.0102
	p-value	(0.2278)	(0.8394)	(0.3009)	(0.8846)	(0.3736)	(0.5751)	(0.4384)	(0.0257)
	W-L	-0.0051	-0.0202	-0.0125	-0.0252	-0.0116	-0.0217	-0.0164	-0.0265
	p-value	(0.8523)	(0.2103)	(0.6034)	(0.1042)	(0.6047)	(0.1848)	(0.4257)	(0.1723)

Panel D

5 FF 10 portfolios

J	**K**	3		6		9		12	
		G 5 ≤	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**	**G 5 ≤**	**G 14 ≥**
3	Loser	0.0164	0.0159	0.0189	0.0116	0.0181	0.0115	0.0152	0.0097
	p-value	(0.3530)	(0.3490)	(0.2192)	(0.3914)	(0.1944)	(0.3607)	(0.1952)	(0.4207)
	Winner	0.0144	0.0098	0.0079	0.0094	0.0045	0.0095	0.0042	0.0036
	p-value	(0.3144)	(0.4573)	(0.3586)	(0.4483)	(0.4430)	(0.3669)	(0.3801)	(0.6375)
	W-L	-0.0031	-0.0073	-0.0121	-0.0033	-0.0147	-0.0031	-0.0121	-0.0072
	p-value	(0.9101)	(0.6920)	(0.5558)	(0.7916)	(0.3798)	(0.7443)	(0.3707)	(0.3772)
6	Loser	0.0310	0.0195	0.0283	0.0166	0.0254	0.0129	0.0270	0.0112
	p-value	(0.1254)	(0.2498)	(0.1093)	(0.2694)	(0.1082)	(0.3567)	(0.0801)	(0.4217)
	Winner	0.0125	0.0030	0.0118	0.0017	0.0075	-0.0008	0.0054	-0.0022
	p-value	(0.2544)	(0.8578)	(0.0891)	(0.8981)	(0.1629)	(0.9370)	(0.3126)	(0.7566)
	W-L	-0.0197	-0.0176	-0.0176	-0.0160	-0.0190	-0.0148	-0.0226	-0.0145
	p-value	(0.4664)	(0.3690)	(0.4276)	(0.3072)	(0.3199)	(0.2337)	(0.2235)	(0.1774)
9	Loser	0.0333	0.0217	0.0309	0.0186	0.0325	0.0144	0.0313	0.0130
	p-value	(0.1083)	(0.2206)	(0.1066)	(0.2834)	(0.0830)	(0.4021)	(0.0727)	(0.4404)
	Winner	0.0178	0.0087	0.0110	0.0029	0.0050	-0.0009	0.0047	-0.0069
	p-value	(0.1469)	(0.4423)	(0.1560)	(0.7414)	(0.4270)	(0.9139)	(0.4176)	(0.2350)
	W-L	-0.0165	-0.0141	-0.0209	-0.0168	-0.0287	-0.0163	-0.0276	-0.0210
	p-value	(0.5359)	(0.3621)	(0.3584)	(0.2688)	(0.1841)	(0.2689)	(0.1596)	(0.1857)
12	Loser	0.0406	0.0218	0.0410	0.0233	0.0370	0.0200	0.0374	0.0123
	p-value	(0.0586)	(0.2972)	(0.0559)	(0.2518)	(0.0652)	(0.3223)	(0.0426)	(0.4516)
	Winner	0.0101	0.0015	0.0066	-0.0020	0.0052	-0.0062	0.0047	-0.0047
	p-value	(0.3706)	(0.8512)	(0.3129)	(0.7662)	(0.3735)	(0.2300)	(0.4166)	(0.3013)
	W-L	-0.0316	-0.0214	-0.0354	-0.0265	-0.0329	-0.0274	-0.0338	-0.0182
	p-value	(0.2210)	(0.2654)	(0.1208)	(0.1520)	(0.1196)	(0.1598)	(0.0776)	(0.2699)

Selling pressure on the G14 losing stocks is considerably higher than for the G5 losing stocks during the formation period, and, as result, any mispricing is corrected by a strong buying pressure over the holding period for the same stocks. For example, the revering returns of the G14 losing stocks are almost three times larger than the reversing returns of the G5 stocks.

During recessionary periods, investors are not reluctant to sell losing weak shareholder rights stocks given that they are harder to value (less transparent) in the case of further bad news, riskier in terms investment recovery and possibly become more illiquid. When regressed on the three (or five)-factor model, momentum portfolios generate negative significant alphas in 10 out of 16 momentum strategies, concentrated on longer observation and holding periods (see table 3.12, panel A). Winners generate positive insignificant alphas, but loser portfolios generate positive significant alphas in 14 out of 16 strategies. Even when regressed on the five-factor model, the loser portfolio generates positive significant alphas in 12 out of 16 strategies (see table 3.12, panel B). The results indicate that commonly known risk factors (market, size, value, profitability, and investment) cannot explain the highly reversing returns of losing stocks with weak shareholders rights. Table 3.11, panel B shows results for the 10-portfolio partition among weak shareholder rights companies (G14) in order to examine the return characteristics of extreme winners and losers in terms of reversals and continuations. Momentum returns are negative across all different observation and holding periods. The lowest momentum is observed when implementing the 12 on 6 strategy with -27.4% annual return. Similar to the 5-portfolio sort, the loser portfolio returns reverse strongly at an increasing (decreasing) rate with longer observation (holding) periods. The winner portfolio shows a return continuation but at a decreasing rate as the observation/holding periods increase. Among stocks with weak shareholders rights, the loser portfolio reversal is significantly greater than the winner portfolio continuation. Momentum returns are negative.

During the recessionary times, it seems that G14 losing stocks are under significant selling pressure over the formation period, which leads to strong reversals across the holding period. On the other hand, G14 winning stocks are under selling (or weak buying) pressure across the formation period, which turns into a delayed (and gradually declining) buying pressure over the holding period. Overall, investors are less (more) reluctant to sell (buy) losing (winning) stocks of weak shareholders rights compared to stocks of strong shareholders rights. Finally, table 12, panels C and D show the results from regressing momentum, loser, and winner returns of the G14 stocks on the three- and five-factor models. Momentum (winner-loser) portfolios have negative insignificant alphas in all strategies (at the 10% significance level). Both extreme winner and loser portfolios of weak shareholder rights companies have positive insignificant alphas across all strategies. Commonly known risk factors (market, size, value, profitability, and investment) fully explain the strong (weak) reversing (continuing) returns of losing (winning) stocks with weak shareholders rights.

To summarise, for the 5-portfolio sort, G5 stocks generate higher momentum returns than G14 due to the strongly reversing returns of the G14 losing stocks (almost three times bigger) compared to G5 losing ones. Further, the reversing returns of the G14 losing stocks produce positive and significant three- and five-factor alphas in most cases. For the 10-portfolio sort (extreme winners and losers), G5 stocks produce significantly higher momentum returns than G14 stocks, but now it is the highly continuing returns of the G5 winning stocks (compared to G14 winners) and the high reversing returns of the G14 losing stocks (compared to G5 losers) that causes this difference.

The analysis analyzing winners and losers separately showed that past winning stocks with weak shareholder rights (G14) gain considerably less to winning stocks with strong shareholder rights (G5), and they both largely produce positive insignificant alphas. Investors' buying pressure for extreme winners of the G14 category fades out quickly, or simply the same stocks are sold early due to fears of being way overvalued or not being able to recover their investment (riskier). G14 losing stocks reverse more strongly than the G5 losing stocks across all strategies. In particular, investors appear to sell more aggressively (and quickly) losing stocks with weak shareholder rights, but they are reluctant and slow to sell losing stocks with strong shareholder rights. Moreover, losing stocks with strong shareholders rights (G5) generate positive and significant 5-factor alphas (in 7 out of 16 strategies) at longer observation/holding periods. In recessionary times, investors handle losing G5 stocks at odds with exposure to commonly known risk factors. Overall, investors are less (more) reluctant to sell (buy) losing (winning) stocks of weak shareholders rights compared to stocks of strong shareholders rights.

3.5.3.3 The effect of shareholder rights vs. risk

In the 5-portfolio sort, regressing winners (of weak and strong shareholder rights) on the three- and five-factor models produces insignificant alphas. G5 and G14 winners have similar exposure to the market (close to 1 on average) and size (close to 1 on average) factors and no exposure to the value factor. G5 and G14 winners do not load on the profitability and investment factors. During recessionary periods, investors buy G14 and G5 winner stocks of small size that are strongly related to the market portfolio. On the other hand, regressing losers on the factor models generates positive and significant alphas only for stocks with weak shareholders rights (G14). Exposure to the market factor is above (less than) two for G14 (G5) losing stocks, while exposure to the size factor is above (less than) one for the same stock categories. Both G5 and G14 losers do not load on the value factor. However, G5 and G14

losing stocks load significantly less on the market and size factors when the five-factor model is considered. Importantly, both G5 and G14 losing stocks load negatively and significantly on the profitability factor (close to -1.5 on average), while only the G14 losing stocks load positively and significantly on the investment factor. So, on the losing side, investors seem to offload more aggressively G14 stocks of low profitability, low investment, and high exposure with the market portfolio. Although the exposure of G14 losers to market, profitability and investment factors is highly significant, G14 stocks are more frequently mispriced, and therefore, corporate governance (or shareholder rights as a characteristic) is a candidate for explaining excess returns.

In the 10-portfolio sort, the winner portfolio return continuation is bigger than the loser portfolio return reversal for G5 stocks, producing positive momentum returns for the same stock category. On the other hand, the reversal of the G14 losers is greater than the continuation of the G14 winners, generating negative momentum returns. Regressing momentum returns on the risk factors gives insignificant alphas for both strong and weak shareholder rights companies (table 3.12, panels C and D). Regressing G5 and G14 winners separately on the risk factors produces mainly positive insignificant alphas for the two stock categories.[30] G5 and G14 winning stocks have similar exposure to the market factor (slightly above one on average) but G5 winners have much higher exposure to the size factor compared to G14 winners. Extreme winning stocks with weak and strong shareholder rights do not load significantly on the value and profitability factors (results unreported). On the winning side and during the recession, investors seem to choose small stocks among the G5 category, while their choice among G14 stocks seems to be focused on the near perfect correlation with the market portfolio returns.

Looking now at the reversing returns of G5 and G14 (extreme) losing portfolios, G5 stocks have a significantly higher (positive) exposure to the market factor and similar exposure to size when compared to G14 losing stocks.[31] When the G5 loser portfolio returns are regressed on the five-factor model there is a significant drop on the loadings of the market and size factors (almost insignificant), while the loading on the value and profitability factors are now

[30] Extreme G5 winners generate positive and significant three- (five-)factor alphas only on three (one) strategies. More, extreme G14 winners give only one negative and significant three-factor alpha (and no significant five-factor alphas).

[31] In some cases, the G5 losing stock loadings on the market factor are almost twice the loadings of the G14 losing stocks.

significant negative and positive respectively. On the losing side, investors appear to be selling G5 stocks with high B/M ratio (value) and low profitability, while their holding period excess returns (alphas) cannot be fully explained by exposure to the five risk factors. When it comes to the extreme losing stocks of the G14 category, their reversing returns load positively and significantly only on the market and size factors. The high reversing returns of the G14 category compared to G5 means that investors disproportionally (and/or more aggressively) sell G14 stocks compared to G5, while their risk factor exposure indicates that investors pay extra attention to small size and significantly outperforming the market G14 losing stocks and high B/M (value) and low profitability G5 losing stocks.[32]

In summary, a momentum strategy applied to all stocks with a corporate governance score generates negative momentum returns from 2000 to 2004. These returns are over-explained (produce negative significant alphas) by the risk factors as the observation and holding periods increase. The momentum strategy is then applied separately to stocks with weak and strong shareholders rights. Companies with strong shareholders rights (G5) generate positive (and insignificant) momentum (excess) returns. G5 winners continue to win and produce insignificant positive alphas in most of the cases (for both the 5- and 10-portfolio sorts). G5 winners load positively and significantly only on the market and size factors. G5 losers reverse over the holding period but their alphas are insignificant across all strategies. In terms of risk factor exposure, the G5 reversing returns load positively (negatively) and significantly on the market (profitability) factor for the 5-portfolio sort and positively (negatively) and significantly on the value (profitability) factor for the 10-portfolio sort. It is worth mentioning here that investors on the winning side (and during recessionary periods), choose G5 stocks of small size and high correlation with the market portfolio, while on the losing side, they oversell stocks of high B/M ratio (value) and low profitability. Companies with weak shareholders rights (G14) generate negative and significant momentum (excess) returns for the 5-portfolio sort but negative and insignificant ones for the 10-portfolio sort. G14 winners continue to win and produce insignificant positive alphas across all strategies and portfolio partitions. G14 winners load positively and significantly on the market and size factors only. G14 losers reverse over

[32] G5 losers reverse at an increasing rate with the holding period, while G14 losers reverse at a decreasing rate with the holding period. This is probably due to the fact that investors sell more aggressively G14 stocks compared to G5 ones when bad news arrives, while they are also more reluctant to add G5 stocks back to their portfolio, thinking that the recent decline in prices reflects a lasting rather than transitory decline in fundamentals. Further, holding losing stocks with weak shareholder rights is possibly riskier (lack of transparency and ambiguity over recovering investment). Therefore, investors may oversell these stocks on a downtrend and overreact on the reversal. This reversal fades as investors become more rational.

the holding period, and their (positive) alphas are highly significant for longer observation/holding periods, especially for the 5-portfolio sort. Further, the G14 reversing returns, for the 5-portfolio sort, load significantly on the market, profitability, and investment factors, while, for the 10-portfolio sort extremes, G14 losing stocks load significantly on the market and size factors only. On the winning side, investors choose G14 stocks of small size and high correlation with the market index, while on the losing side, they seem to oversell stocks of low profitability, low investment, and high correlation with the market returns.

During the recessionary period, G14 losing stocks of the 5-portfolio sort are frequently mispriced when regressed on the three- and five-factor models, while for the 10-portfolio sort, the extreme G5 losing stocks produce positive and significant alphas. Therefore, corporate governance (or shareholder rights as a characteristic) is a candidate for explaining excess returns. Overall, investors are less (more) reluctant to sell (buy) losing (winning) stocks of weak shareholders rights compared to stocks of strong shareholders rights, especially during recessionary periods.

3.5.4 Summary

Overall, the results show that in a recession period, implementing a momentum strategy on the overall market generates negative returns. This outcome is mainly driven by the strongly reversing returns of the loser portfolio and weak continuing returns of the winner portfolio. In a down-trending market, further bad news on losing stocks puts extra selling pressure during the formation period, which turns into a buying pressure, and there is a strong reversal during the holding period. More important, loser (momentum) portfolios generate positive (negative) significant three- and five-factor alphas at longer observation/holding periods. However, a momentum strategy based on shareholder rights generates more interesting results. Implementing the 5-portfolio partition momentum strategy on strong shareholder rights companies (G5) generates positive returns (winner portfolio continuation is greater than loser portfolio reversal), which are mainly explained by exposure to the risk factors. Similarly, the winner and loser stock portfolios produce insignificant alphas when regressed on the three- and five-factor models. On the other hand, weak shareholders rights companies (G14) generate negative momentum returns (loser portfolio reversal is greater than winner portfolio continuation) that cannot be explained by exposure to the three- and five-factor models, especially for longer observation/holding periods. This is largely explained by the significant

reversing returns of the loser portfolio, which generates positive and significant alphas for the same observation and holding periods.

In recessionary times, investors seem to put increased selling pressure on losing stocks of weak shareholder rights (G14) compared to strong shareholder rights (G5) during the formation period that turns into a strong buying pressure (and a strong reversal) during the holding period and also is at odds with exposure to risk factors. The results suggest that investors react differently to companies based on their level of shareholders rights. Comparing the 5-portfolio momentum strategy on strong (G5) and weak (G14) shareholder rights companies shows that G5 always have positive momentum returns, while G14 have negative momentum returns. Winner portfolios of strong shareholder rights (G5) generate larger returns than that of weak shareholder rights (G14). Loser portfolios of the G14 category generate significantly higher (reversing) returns than that of G5, which makes the momentum strategy positive in G5 and negative in G14. A comparison of the factor model loadings across the G5 and G14 winning stocks shows that both stock categories load similarly and significantly on the market and size factors. When it comes to past losing stocks, G5 and G14 stocks load positively and significantly on the market and size factors for the three-factor model. G5 losing stocks load positively (negatively) and significantly on the market (profitability) factor, while G14 stocks load positively (negatively) and significantly on market and investment (profitability) factors for the five-factor model.

Analysis then turns to the behaviour of extreme stocks in the 10-portfolio momentum strategy. For companies with strong shareholder rights (G5), momentum returns are mainly positive and produce insignificant alphas across all strategies (only the 12 on 12 strategy produces a negative significant 5 factor alpha). Further, the loser portfolios produce insignificant alphas when regressed on the three- and five-factor models, while the winner portfolios produce positive significant alphas only on three (one) cases when regressed on three (five) factors. Weak shareholders rights companies (G14) generate negative momentum returns but these are also explained by exposure to commonly known risk factors. Similarly, the (extreme) winner and loser portfolios of weak shareholder rights companies (G14) generate insignificant three- and five-factor alphas across all investment strategies. There is increased selling pressure from investors on losing stocks of weak shareholder rights (G14) during the formation period, which turns into a strong buying pressure (and a strong reversal) during the holding period. However, it seems that the strong reversing returns of the G14 loser portfolio are fully explained by

exposure to commonly known risk factors. Comparing the 10-portfolio momentum strategy on strong (G5) and weak (G14) shareholder rights companies shows that G5 stocks have mostly positive momentum returns, while G14 have negative momentum returns. Winner portfolios of strong shareholder rights (G5) generate significantly larger returns than that of weak shareholder rights (G14). Further, loser portfolios of the G14 category generate considerably higher (reversing) returns than that of G5 one, which makes momentum strategy positive in G5 and negative in G14.

When regressing the 10-portfolio momentum returns on the three-factor model, both winners of G5 and G14 have significant exposure to the market factor. However, winners of the G5 category have significantly greater exposure to the size factor compared to G14. During a recessionary period, investors extreme past winning G5 stocks of small size that outperform the market. More, when G14 companies win, investors do not seem to pay attention to any characteristic other than the stock's correlation with the market. When considering the loser portfolio, both G5 and G14 stocks have significant (and positive) exposure to the market and size factors, but only the G14 stocks load positively and significantly on the same factors for the five-factor model. Extreme G5 losing stocks load positively (negatively) and significantly on the value (profitability) factors when regressed on the five-factor model. During recessionary periods, investors sell G14 (extreme) losing stocks of small size that outperform the market, as well as G5 extreme losing stocks of high B/M ratio (value) and low profitability.

3.6 Discussion

3.6.1 Market momentum

For the full period and for all stocks with a corporate governance score, there are positive momentum returns that are fully explained by exposure to commonly known risk factors. Looking at winners and losers separately produces positive and significant 3- and 5-factor alphas for winners but insignificant ones across all strategies for losers. The winner portfolio return continuation decreases with the holding period across all observation periods but the shortest one (3 months), while the loser portfolio (reversing) returns increase with the holding period for all observation periods. Further splitting the sample into an expansionary and a recessionary period to examine whether momentum returns depend on the different market states reveals some differences. For the expansionary period running from 1990 to 1999, there

are positive momentum returns that increase with the observation period and decrease with the holding period. While momentum returns are higher than those obtained during whole period, 3- and 5-factor alphas are still insignificant. Similar to the whole period, past winners generate positive and significant alphas for most strategies, while past losers give insignificant alphas. Winner portfolio returns increase (decrease) with the holding period for the 3 (9) and 6 (12) observation periods. Loser portfolio returns decrease (increase) with the holding period for the 3 (9) and 6 (12) observation periods.

During the recessionary period, there are negative momentum returns driven by the strong reversing returns of the loser portfolio. Momentum return alphas are negative and significant for almost half of the strategies. Regressing winner and loser portfolio return on the factor models gives largely positive and significant alphas for the loser portfolios and insignificant alphas for the winners. Interestingly, loser portfolio reversing returns increase with the holding period for the 3-month observation period and decrease with the holding period for the 6, 9, and 12-month observation periods. Winner portfolio returns decrease with the holding period for all observation periods. During the expansionary period there are highly positive momentum returns driven by the high return continuation of past winners. While momentum returns give insignificant alphas, the winner portfolios mainly produce positive and significant excess returns. So, it looks like investors put strong buying pressure on past winners, and their prices reach levels much higher than their exposure to commonly known risk factors would dictate. Further, during the recessionary period there are negative momentum returns driven by the strongly reversing returns of the loser portfolios. Momentum excess returns are significant and negative for almost half of the strategies. Importantly, the reversing returns of the loser portfolios generate positive and significant alphas in most strategies. Investors put strong selling pressure on past losing stocks, while their reversing returns cannot be explained by the risk factors. These results confirm that momentum returns depend on the state of the market. More importantly, while a momentum strategy does not yield significant excess returns, investing in winners (losers) in an expansionary (recessionary) period produces positive excess returns.

3.6.2 Corporate governance momentum

Looking at return continuations and reversals for stocks with different shareholders rights produces very interesting results. For the whole period, G5 winners produce positive and

significant alphas more often than G14 winners. Further, the reversing returns of the G14 losers are significantly higher than those of the G5 losers, but both are explained by the risk factors. Winner (loser) portfolio returns decrease (increase) with the holding period for observation periods 6, 9 and 12 months for both G5 and G14 stocks. Importantly, none of the momentum portfolios, either for G5 or G14 stocks, produce significant excess returns.

When considering extreme winning and losing stocks, winners of the G5 category yield significantly higher returns than winners of the G14 category. Further, G5 winners produce mostly insignificant alphas (only a few positive significant ones), while G14 winners produce largely negative and significant 5-factor alphas. G14 extreme losers still reverse more strongly the G5 extreme losers, but they both give insignificant excess reversing returns. This explains the negative and significant excess momentum returns for the G14 stocks. Over the whole period, past winning stocks of both categories are fairly mispriced (positive significant alphas) but, when extreme past winners are considered, G14 stocks yield returns considerably lower than their exposure to risk factors (negative significant alphas). It seems that investors are reluctant to buy (or exercise significantly low buying pressure on) extreme winning stocks with weak shareholders rights (G14). From the risk factor analysis, investors buying up G14 winners seem to be particularly interested in those with high profitability and low investment on the 5-portfoilio partition and high profitability and book-to-market ratio (value) on the 10-portfolio sort, possibly as a hedge to adverse future events/news and limited shareholders rights. Considering the expansionary period, both G5 and G14 stocks give positive momentum returns but none of them give a positive and significant alpha. It is the G14 winners that more consistently produce positive and significant alphas compared to G5 winners. Interestingly, winner portfolio returns increase (decrease) with the holding period for observation periods of 3 (9) and 6 (12) months for both stock categories. Among the loser portfolios, G14 stocks produce significantly higher reversing returns than G5. However, both are explained by risk factors (insignificant alphas).

Turning to the extreme past winners and losers (10-portfolio partition), again the winners of the G5 category produce significantly higher returns than G14 winners. G5 winners generate mostly insignificant alphas (only a few are significant and positive), while G14 winners yield negative and significant three- and five-factor alphas. Both the G5 and G14 loser portfolios give insignificant excess returns across all strategies, despite G14 extreme losers reversing more strongly than the G5 extreme losers. Return continuations (reversals) for G14 stocks

increase (decrease) with the holding period for all observation periods but momentum excess returns for G14 stocks are still negative and significant.

During the expansionary period, past winning stocks in the G14 category are far more often mispriced compared to G5 category but, when extreme past winners are considered, G14 stocks yield returns considerably lower than their exposure to the risk factors (negative significant alphas). Investors put strong buying pressure on G14 winning stocks but are reluctant to buy (or exercise significantly low buying pressure on) extreme winning stocks of the same category. From the risk factor analysis, investors buying up G14 winners will even choose stocks with low profitability in the 5-portfolio partition, but they will consistently choose stocks of high profitability and book-to-market ratio (value) in the 10-portfolio partition, possibly as a hedge to adverse future events/news and the limited shareholders rights. Over the recessionary period, G5 stocks yield positive momentum returns, while G14 stocks yield negative momentum returns. More importantly, the G14 loser portfolios generate positive and significant alphas in most strategies. The loser portfolio reversing returns for G14 stocks increase (decrease) with the holding period for the 3 (9) and 6 (12) month observation periods. However, the G5 loser portfolio produces reversing returns considerably smaller than the G14 losers, and alphas are insignificant across all strategies. Regarding winners, G5 stocks yield higher holding period returns than G14 stocks but both stocks give alphas that are insignificant. Among extreme winners and losers, again the reversing returns of the G14 losers are significantly higher than those of the G5 losers but their alphas are largely insignificant. Further, winners of the G5 category produce significantly higher returns than the G14 winners. G5 and G14 extreme winners largely give insignificant alphas, with G5 winners only providing a few positive and significant alphas. Over the recessionary period, investors are less (more) reluctant to sell (buy) losing (winning) stocks of weak shareholders rights (G14) compared to stocks of strong shareholders rights (G5). From the risk factor analysis, investors are observed offloading more aggressively G14 losing stocks of low profitability, low investment, and high exposure with the market portfolio.

3.7 Conclusion

This chapter has investigated return continuations and reversals of stocks with different corporate governance scores (or shareholders rights) and tries to shed some light on whether or not corporate governance structure affects momentum returns or investors' decisions to buy

past winners and losers. Analysis uses the Gompers, Ishii and Metrick (2003) dataset, which runs from 1990 to 2007 and assigns to each stock a corporate governance score from 1 to 24 indicating the number of provisions either restricting shareholder rights or increasing managerial power. This chapter focused on stocks with a corporate governance score of 5 (or less), the democratic or strongest rights companies, and on stocks with a corporate governance score of 14 (and above) – the dictatorship or weakest rights companies. If companies with weak shareholder rights or corporate governance structure (G14) are possibly riskier in terms of investment recovery and less transparent in terms information disclosure then investors might be more (less) reluctant to buy (sell) G14 winners (losers) when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas). Looking at the overall momentum strategy results, the analysis shows that during the expansionary period, highly positive momentum returns are driven by the high return continuation of past winners, while, during the recessionary period, negative momentum returns are driven by the strongly reversing returns of the loser portfolios. Although momentum returns give largely insignificant alphas, winner portfolios produce positive and significant excess returns during the expansionary period, while the reversing returns of the loser portfolios generate positive and significant alphas during the recessionary period.

When examining return continuation and reversal for stocks with strong and weak shareholders rights, it is winning stocks with weak shareholders rights (G14) that produce positive and significant alphas during the expansionary period, and losing stocks of weak shareholders rights (G14) that generate positive and significant alphas during the recessionary period. The risk factor analysis shows that investors buying up G14 winners during good times will even look at stocks with low profitability (apart from being small and highly correlated with the market index), while when they sell G14 losers, at bad times, they particularly choose stocks of low profitability, low investment, and high exposure with the market portfolio. As far as extreme winners and losers are concerned, G14 winners give positive and significant alphas for the expansionary period, indicating that investors are reluctant to buy extreme past winners in the G14 (dictatorship) category, which often leads to mispricing relative to risk factor exposure. Moreover, extreme G14 losers produce insignificant alphas for both the expansionary and recessionary periods. On the other hand, extreme G5 winners produce a few positive and significant alphas, indicating that investors are less reluctant to buy extreme winning stocks in the G5 (democracy) category and leading to a few instances of mispricing either in good or bad times.

This chapter shows that corporate governance structure, or shareholder rights, has an impact on momentum returns. Implementing the momentum trading strategy on portfolios of stocks with different shareholders rights shows that for stocks with a dictatorship corporate governance structure (G14), past winner and loser stocks produce significant positive excess returns during an expansionary and recessionary period, respectively. This result is consistent with the return behaviour of winners and losers when implementing the momentum strategy across all companies with a corporate governance score. In particular, during the expansionary period winners produce positive and significant excess returns, while during the recessionary period losers generate positive and significant alphas. The mispricing of G14 stocks could potentially be attributed to the fact that companies with weak shareholder rights or corporate governance structure (G14) are riskier, in terms of investment recovery, and less transparent, in terms information disclosure. Thus, investors are more (less) reluctant to buy (sell) G14 winners (losers) when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas). Companies with weak shareholders rights or corporate governance structure might be of less interest to financial analysts, and so a smaller number of them may follow these stocks on a regular basis. As a result, news about these companies takes longer to disseminate and to be incorporated into current prices, pushing G14 stocks away from fundamental prices for longer periods. This chapter have multiple practical implications. It shows that corporate governance levels not only affect how the firm is preserved with investors, in terms of firm's commitment to good corporate governance structure, but also affects how investors react when buying and selling stocks. It shows that when a firm has dictatorship shareholders rights, investor is reluctant to further buy its winning stocks, even when it already winning with good news, because of fears of their shareholders rights levels. Such implication could cost firms that are looking to raise capital as less investor are enthusiastic about the firms' stock. There are a couple of limitations to this chapter however. Such limitations are associated with the fact that there is only limited data on corporate governance measured by the G index. This study has analyzed the full time period where the G index data is available. Had more data been available for longer period, this study could have been more robust. Although corporate governance structure seems to be related to returns behaviour of past losers and winners, future research combining other sources of momentum with corporate governance will contribute further to the factors determining stock return continuations and reversals. Moreover, future research could make more robust the findings of this chapter by looking at different indexes that measure corporate governance levels, including ones with an extended dataset that include

more variables. This chapter examined the US market; future research could tackle the same relationship between corporate governance and momentum in different countries.

Chapter Four: 52-week high, momentum and investor sentiment

4.1 Introduction

The source of momentum returns has long been a topic of debate in the finance literature. One group of scholars attribute the excess returns associated with a momentum strategy to additional risk taking from investors as they focus on riskier stocks that have been going in one direction for a considerable time (3, 6, 9 or 12 months). Investing in small or value stocks could also be considered excessive risk taking (Fama and French, 1993). Momentum is also affected by a firm's credit rating. Avramov et al. (2007) show that firms with low credit ratings exhibit higher momentum, while high credit rating firms exhibit lower momentum. This is due to firms with low credit rating taking higher risks to accommodate their position in the hope of making profits and being able to pay their debts. When such high-risk projects pay off, investors buy the stock. Other scholars suggest that human reaction to news is the source of momentum returns. Hong and Stein (1999) and Hong, Lim and Stein (2000) show that momentum returns are affected by how investors react to news. They also find that momentum returns are conditional on how fast the information diffuses across the market. George and Hwang (2004) and Liu, Liu and Ma (2011) show that investors act differently based on the difference between current stock prices and their 52-week highs. They show that when combining momentum returns and the nearness of the 52-week high, momentum is more powerful and produces significantly higher momentum than when only sorting by the JT strategy. They conclude that 52-week high information is a better predictor for future returns than past returns. Their model assumes that both JT momentum and 52-week high momentum are driven by the same source. Hao et al., (2018) use a different approach to see the effect of investor sentiment on price momentum and 52-week high. They do that by controlling for investor sentiment when analysing 52-week high momentum returns.

Hao et al., (2018) follow the methodology of Antoniou et al. (2013) who introduced the link between investor sentiment and momentum returns. However, Antoniou et al. (2013) find that momentum is only profitable when sentiment is high. These findings are attributed to the loser portfolio being under-priced in optimistic periods, as small investors are slow to sell their losing stocks in optimistic periods. Scholars have struggled to find a clear explanation for

momentum profits despite multiple proposed explanations in the literature. This opens the door for more research on the subject. This chapter will tackle the assumption made by George and Hwang (2004) and Liu, Liu and Ma (2011) that momentum profits are not only driven by 52-week high but also that momentum and 52-week high are driven by the same variables. This is done using the same methodology as in George and Hwang (2004) and Liu, Liu and Ma (2011), but incorporate the additional analyses and robustness findings found in Hao et al., (2018). Although they do an in-depth analysis of the effect of investor sentiment on 52-week high momentum, there are other areas that are left out of the analysis that contribute to and verify their findings. This chapter will also investigate the relationship between momentum returns, the 52-week high and investor sentiment. The current literature shows that behavioural biases such as anchoring, the disposition effect and cognitive dissonance have the power to explain or predict future returns. This contributes to the existing literature of behavioural finance by investigating the interplay between the aforementioned behavioural biases and using a double sort (JT momentum, 52-week high momentum) investment strategy across periods of optimistic and pessimistic sentiment. The investment strategies apply to all US stocks from 1965 to 2018 and data is collected from CRSP on a monthly and daily frequency.

In the literature, many variables are established to have explanatory powers over momentum returns. Academics and market participants alike, struggle to know which of these variables have stronger effect on momentum. Thus, in this chapter tackles three explanatory variables that are the disposition effect, anchoring effect and cognitive dissonance simultaneously to see whether any of them have stronger effect on momentum over the other variables. The results show that momentum returns are significantly affected by investor sentiment. Following an optimistic period, momentum returns are significantly higher and positive than following a pessimistic period. The high momentum returns, during an optimistic period, are attributed to the loser portfolio return continuations, while during the pessimistic period, winners and losers produce very high return continuations and reversals, respectively. These findings are consistent with the findings of Antoniou et al., (2013) who show that momentum is driven by the loser portfolio in optimistic sentiment periods and the winner portfolio in pessimistic sentiment periods. Investor sentiment is also important factor in explaining the 52-week high momentum strategy. Following an optimistic period, the 52-week high momentum portfolio yields significantly higher and positive returns than following a pessimistic period. The large 52-week high momentum returns during an optimistic period are also attributed to the loser portfolio return continuations, while during the pessimistic period, near and far stocks generate

very high return continuations and reversals, respectively. It shows that both momentum and 52-week high strategies are strongly affected by investor sentiment, which indicates the return continuations or reversals can be explained by behavioural biases such as the disposition effect, anchoring and cognitive dissonance.

The double-sort portfolio strategy gives some interesting results. Implementing a 52-week high (near minus far) strategy within the winner portfolio generates considerably higher and positive returns than applying the 52-week high strategy within the loser portfolio. When considering optimistic and pessimistic investor sentiment, the results change. During an optimistic period, the near minus far portfolio generates highly positive returns which are attributed to the high return continuations of the near portfolio within past winners and the strong return continuations of the far portfolio within past losers. In pessimistic periods, however, investors do not pay attention or are reluctant to act upon 52-week high information. Interestingly, the pessimistic investor sentiment enhances winner portfolio continuations and loser portfolio reversals but only small differences in returns between the near and far portfolio are observable, and especially at longer holding periods. These findings are in line with the findings of Hao et al. (2018) that the 52-week high is a better predictor for future returns. However, the results show that this is true mainly in optimistic periods. Moreover, applying a momentum strategy having already controlled for 52-week high reference point yields significantly higher and positive returns for the near portfolio compared to the far portfolio. On the other hand, in an optimistic period, momentum returns are significantly higher and positive for the far portfolio compared to the near one. This result is attributed to the strong return continuation of losers within the far portfolio and the pronounced cognitive dissonance effect (bad news contradicts the positive investor sentiment). In a pessimistic period, stocks that are near their 52-week high show positive momentum returns, while stocks that are far from their 52-week high produce negative momentum returns. This result is attributed to the strong return continuation of winners within the near portfolio and the pronounced cognitive dissonance effect (good news contradicts the pessimistic investor sentiment). Overall, the results show that investors who primarily focus on the stocks' position relative to their 52-week high will make a positive momentum return due to winners in pessimistic periods and due to losers in optimistic periods. This is consistent with and provides further support to the cognitive dissonance effect of Antoniou et al. (2013). Finally, these findings are novel and show that anchoring reinforces the disposition effect, while investor sentiment has the ability to override anchoring and to either weaken or strengthen the disposition effect.

The remainder of the chapter is structured as follows. Section 2 summarises the existing relevant literature. Section 3 explains the theoretical framework of the study and the hypotheses to be tested. Section 4 details the dataset and methodology used in the empirical analysis, while Section 5 presents the empirical results of the study. Finally, section 6 provides the conclusion.

4.2 Research background

4.2.1 Momentum

Momentum anomalies has always been a controversial subject in the financial literature. Jegadeesh and Titman (1993) look at the performance of past winners and losers, finding that stocks that have been moving in one direction in the recent past (3, 6, 9 and 12 months) continue to move in the same direction in the near future (3, 6, 9 and 12 months). Their results come as a contradiction to the EMH. The weak form of market efficiency argues that investors cannot make money based on public information, which is exactly what momentum strategy does. Jegadeesh and Titman's findings were not the first attempt to exploit the EMH's weaknesses. De Bondt and Thaler (1985) looked at long-term reversals in stock returns (the contrarian strategy). They looked at stocks that have been going in one direction for the past year or more and found that these stocks on average reverse their direction in the next period. The reversal continues up to 36 months. They have also found that the reversal is based on the magnitude of the first move. In other words, stocks with the highest (lowest) returns in the past, will have the strongest (weakest) reversal in the future. They believe that investors over buy (sell) stocks that have been going in one direction for a long time and thus they drive the stock prices away from their true values. In other words, investors overreact to current prices and overbuy or oversell stocks. This allows rational investors to exploit this mispricing and buy (sell) undervalued (overvalued) stocks which in turn creates the reversal. Other scholars have found that both the underreaction (momentum) and overreaction (contrarian) are connected phenomena in the market, where stocks exhibit short term underreaction and long-term overreaction.

The inability of Fama and French's 3FF and 5FF models to explain momentum returns created a puzzle in studying the source of momentum profits. Two main schools of thought were used to explain this anomaly. The first school attributes the excess returns to risk factors, that are not related to size or value, while the other school attributes momentum to behavioural factors.

This argument is still ongoing in the literature and no clear answer has been found. Risk-based theories of explaining momentum returns found that even though momentum has a negative relation with size, it does appear in mid- to large-size firms (Rouwenhorst, 1998; Fama and French, 2012). Other studies have shown that even after controlling for firm specific characteristics, the momentum effect appears to be significant (Lui, Strong and Xu, 1999). Others believe that momentum profits are driven by macroeconomic risk factor (Griffin, Ji and Martin, 2003) and country-level individualism (Chui, Titman and Wei, 2010). There is evidence that industry momentum accounts for much of the profits generated by the traditional momentum strategy (Moskowitz and Grinblatt, 1999). Moskowitz and Grinblatt show that a momentum strategy based in specific industries would yield significantly higher returns than a conventional momentum strategy and that traditional momentum strategy profits are driven by industry momentum and is found to be significant even in large and liquid companies. However, this only explains part of the puzzle. Part of the returns are driven by industry momentum, but industry momentum is also a puzzle of its own. Other scholars have taken a different approach, based on the idea that momentum profits could be related to firm-specific factors. Sagi and Seasholes (2007) find that companies with high revenue growth volatility, low costs and valuable growth options outperform the results of the traditional momentum strategy by 5% per year. Other sets of firm specific attributes like firm size, poor performance and higher trading costs are also associated with momentum profits (Lesmond, Schill and Zhou, 2004). One firm-specific attribution that has generated a lot of attention in the literature is a firm's credit rating and how it affects momentum returns. Avramov et al. (2007) find that low credit rating firms have a positive relationship with momentum after controlling for return distribution, overall momentum profits, industry momentum, size and risk factors. The reason behind it is that firms with low credit ratings tend to take greater risks and thus momentum profits arise from a reaction to information regarding a company's operating performance. These companies also tend to have higher return volatility and high analyst dispersion, which is common given their operating risk. The findings of the study could be interpreted as momentum being based on risk factors and not on behavioural ones.

Supporters of the other school of thought believe that since there is no strong causal relationship between momentum profits and any of the factors that have been discussed in the literature, it is likely that momentum profits are driven by behavioural factors. Hong and Stein (1999) link momentum profit to underreaction, which Jegadeesh and Titman (1993) referenced in their original study. Hong, Lim and Stein (2000) believe that since underreaction to news is the main

source that derives momentum then the tool that drives the news should affect momentum as well. They show that momentum is positively related to the number of analysts that cover the company. They show that companies with a high number of analysts exhibit lower momentum than companies that are followed by lower number of analysts.[33]

4.2.2 52-week high

The work of Jegadeesh and Titman (1993) has been extended by many scholars. Some improve the robustness of their work by putting the momentum strategy to an out-of-sample test, while others include new explanatory variables. Some of scholars suggest that past returns do not predict future returns, but rather the nearness of the 52-week high does (George and Hwang, 2004). When compared to the conventional momentum strategy, the 52-week high dominates future returns. Further, their results show that returns on the 52-week high do not exhibit a long-term reversal, which indicates that short term underreaction and long-term reversal are separate phenomena. Their results raise the question of whether the overreaction and underreaction coexist at the same level as stocks underreact in the short term and overreact in the long term (Barberis, Shleifer and Vishny, 1998; Daniel, Hirshleifer and Subrahmanyam, 1998). The original theory of underreaction and overreaction suggest that both underreaction and overreaction coexist because investors are reluctant to change their opinion in the short term and thus, when they eventually do, they overreact to the news.

George and Hwang (2004) also suggest that since the returns on the 52-week strategy are superior to those of the conventional momentum strategy, nearness of the 52-week high is a better predictor of future returns than past returns used by conventional momentum strategy of JT. However, both strategies look at different available information in the marketplace. Investors use the 52-week high as a reference point to which they anchor and weigh the news. Usually, investors would stop buying around the 52-week high assuming that such a reference point should hold the stock price; however, the news eventually pushes the stock to new 52-week high and the buying pressure will cause a continuation in the same direction. When the price is neither near nor far from the 52-week high, investors react to the news more rationally

[33] The reason being that when a company has a low number of analysts following them, information diffuses gradually and reaches market participants at different times. The reaction spreads over time, unlike when the company is followed by many analysts who reach a large portion of the market participants, who can then react to the news at the same time (Hong, Lim and Stein, 2000). Other papers used different measurements for information diffusion, option implied volatility and found similar results (Chen and Lu, 2017).

and prices incorporate news in a timely manner. This rejects the theory that investors use acquisition price as a reference point and anchor around it; rather, the 52-week high is the dominant reference point. Even when considering acquisition price as control for future returns, the 52-week high strategy generates more returns. Thus, they believe that the 52-week high is a better predictor of future returns. The 52-week high strategy has also been tested outside of the US market. The 52-week high is not only profitable inside the US but it is even more profitable outside the US (Australia) than inside the US according to Marshall and Cahan (2005) and Liu, Liu and Ma (2011). However, when other studies have tested the 52-week high strategy on other international markets, they have found that even though the 52-week high strategy yields positive returns, it does not exceed the returns from the conventional momentum strategy (Gupta, Locke and Scrimgeour, 2010). This result again indicates that the 52-week high strategy and the JT momentum strategy vary in different market states and countries and might be driven by different mechanisms, as George and Hwang (2004) predicted. Since the 52-week high strategy shows out-of-sample robustness, scholars turned their attention to look for the source of 52-week high profits. As George and Hwang (2004) stated, investors use the 52-week high and low as a reference point to anchor beliefs about their investments. In other words, as prices approach the 52-week high (low), investors are reluctant to change their views to buy (sell) into the uptrend (downtrend), and thus they either do not buy or short the stock. However, based on the magnitude of the news, the stock price eventually crosses the threshold for the new 52-week high (low) and investors then feel as they have missed out on the move and thus change their views aggressively and "overreact" to it which in turn leads the stock price to go even higher (lower).

What makes this theory interesting is that in conventional momentum strategy, when prices overreact to news they push stock prices above their equilibrium price in the short term and thus in the long term, stocks are subject to a reversal that is similar in magnitude to the uptrend (De Bondt and Thaler, 1985; Chen, Hua and Jiang, 2018). The robustness of anchoring bias as the driver of not only 52-week high returns but also the momentum strategy was further tested. Burghof and Prothmann (2011) use information uncertainty as a factor in determining the anchoring bias, as behavioural biases increase in information uncertainty. They find that when information uncertainty is high, the 52-week high strategy returns increase. Six different variables were used to measure information uncertainty and all of these variables suggest increasing 52-week high returns when information uncertainty is high. Scholars have tested post-earnings-announcement drifts (PEAD) as a source of 52-week high momentum returns

(George, Hwang and Li, 2014). Their findings reject the effect of PEAD and supports the anchoring theory. Further studies have examined whether the timing of reaching the nearness of the 52-week high contributes to how large those returns are. Bhootra and Hur (2013) examined a set of stocks that have recently reached nearness of 52-week high, finding that these stocks outperform stocks that have been around the 52-week high for a long time. They believe that their findings are driven by anchoring and adjustment bias along with recency bias.[34] Hao et al. (2016) provided a new perspective on the problem, to which they test whether the 52-week high returns are driven by the recency effect. They find mixed results suggesting that both the 52-week high strategy and the recency strategy coexist in the Taiwan stock market. This further supports the idea that both momentum strategies and 52-week high strategy depend on different market aspects and different investor behaviours. Further studies have tried different variables that could explain the 52-week high returns. Chang, Chen and Kuo (2017) conditioned the 52-week high returns on herding behaviour of investors. They find that using 52-week high strategy conditioned on herding yields significantly higher returns than the conventional 52-week high strategy. They note that their study was implemented on the Taiwan stock market in which 70% of participants are individual investors.

On the other hand, the work of Hao et al., (2018) introduces a new approach for explaining 52-week high momentum returns. They believe that 52-week high momentum return is affected by other factors and not only their nearness to the 52-week high. They control for investor sentiment when implementing the 52-week high momentum returns. They find that in periods of high sentiment, 52-week high momentum is significantly higher than in periods where investor sentiment is low. Hao et al., (2018) follow George and Hwang's (2004) method in calculating nearness of the 52-week high and Jegadeesh and Titman (1993, 2001) when calculating momentum returns. They also use the Baker and Wurgler's (2006) method to measure investor sentiment and use their investor sentiment data. They start by ranking stocks based on their nearness of the 52-week high into 10 deciles. The top three deciles (30%) are considered a winner portfolio and the bottom three deciles (30%) are considered a loser portfolio. The difference between the close and far is the 52-week high momentum return. They

[34] More support for the anchoring theory comes from Driessen, Lin and Van Hemert (2013), who analyse whether option implied volatility changes when stocks are near their 52-week high. They find that stock betas and volatility decrease as price approaches the 52-week high but then increases when the breakout happens. This effect can be explained by the anchoring theory as traders use the 52-week high as a reference point. However, they also point out that indeed 52-week highs and lows affect trading behaviour, but whether trading behaviour affects stock prices is a different matter.

report significant differences between momentum for stocks near their 52-week high and stocks that are far from it, even after controlling for Fama and French risk factors. Stocks that are close to their 52-week high have significantly higher returns than those that are far from it. Their results show that 52-week high returns are not only affected by investor sentiment, but also these profits persist up to five years after portfolio formation. 52-week high momentum is higher during optimistic periods. They argue that since investor sentiment affects both winner and loser portfolio, it contradicts the findings of Antoniou et al., (2013) in which they show that investor sentiment is more significant for loser portfolio during optimistic periods due to short selling constraints. They also find that the returns of the 52-week high strategy persist for up to 5 years, which is longer than what JT had previously shown (12 months). Thus, slow diffusion of information argument is rejected since it is based on the long-term reversal after the initial underreaction to news. They conclude that 52-week high returns are driven by anchoring bias and not the slow diffusion of information argument of Hong and Stein (1999) for the reasons stated above. They show that the main driver of returns in the winner portfolio is high earnings surprises during high sentiment periods. However, since Hao et al., (2018) rank by nearness of 52-week high and not past returns, this type of ranking could overlook the effect of the pure momentum returns. A more comprehensive analysis would be to conduct a pairwise analysis and a double sorting analysis by ranking first by nearness of 52-week high and then by past returns and secondly, ranking by past returns first and then by the nearness of the 52-week high. Failing to do so could overlook the effect of momentum on the 52-week high returns, which in turn could be the real source of the 52-week high momentum.

This paper expands on the work of Hao et al., (2018) by introducing a multiple pairwise analyses that first ranks by 52-week high, then past returns. It then first ranks by past returns and then 52-week high, and finally looks at both strategies independently.

4.2.3 Investor sentiment

Around the same time as George and Hwang (2004) published on the 52-week high and its effect on future returns, Baker and Wurgler (2006) introduced a new model to explain stock return cross-sectional data. They introduced an investor sentiment proxy to see how high and low sentiments explain cross-sectional variation in returns. They find that low sentiment only affects stocks with specific characteristics. Stocks whose valuation is subjective and difficult to arbitrage. These stocks are small, young, high volatility, unprofitable, non-dividends paying

and distressed stocks, which yield higher returns when sentiment is low, but low returns when sentiment is high. They believe that investor sentiment affects all stocks, but the effect varies from one stock to another. To measure investor sentiment, Baker and Wurgler (2006) construct a proxy that they believe is a good measure indicator of investor sentiment. This proxy consists of several variables. Variables that make up the investor sentiment index include closed-end fund discount, NYSE share turnover, number and average first day returns on IPOs, the equity share in new issues and the dividend premium. They conclude their study by emphasizing that their results contradict what the classical finance theory suggests that investor sentiment does not affect cross section of stock prices, returns or expected returns. In a later paper, Baker and Wurgler (2007) confirm the findings of their first paper.

Other scholars have studied the relationship between investor sentiment and a set of market anomalies. Stambaugh, Yu and Yuan (2019) use investor sentiment to predict expected returns on financial distress, net stock issues and composite equity issues, total accruals, net operating assets, momentum, gross profitability premium, assets growth, returns on assets and investment to assets. They select these anomalies specifically because these anomalies survive exposure to the three-factor model of Fama and French (1993). They use the Baker and Wurgler (2006) investor sentiment index to measure investor sentiment. Results show that these anomalies have higher returns when followed by high sentiment years. They also note that in a separate regression, returns from all the 11 strategies does not correlate with each other. A more detailed study was conducted by Antoniou et al. (2013) that look in-depth at the effect of investor sentiment on the momentum returns of Jegadeesh and Titman (1993). They hypothesise that when news contradicts investor sentiment, it causes cognitive dissonance which in turns slows investor reaction. They find that momentum profits only arise under optimism, which is driven by strong momentum from the losing portfolio, and the continuation for winner portfolio during pessimistic periods. They add that continuation in an optimistic period is stronger than during pessimistic periods because short selling during optimistic periods would be costlier as stocks generally reflect a price premium. By using intraday transaction data to estimate stock-by-stock order imbalances during optimistic and pessimistic periods, they find that small investors, but not large, are slow to sell losers in optimistic periods due to cognitive dissonance. On the other hand, large investors are quicker to sell their losing stocks during optimistic periods, which indicates they are less affected by the cognitive dissonance effect. In their study, they use the consumer confidence index to measure investor sentiment. They find that when sentiment is optimistic, momentum yields significant average monthly returns of 2%, but when sentiment

is pessimistic, momentum drops to an insignificant 0.34%. When regressed on the three-factor model of Fama and French (1993), the results produce positive significant alphas. Also, they note that momentum profits in optimistic periods are driven by continuation in the loser portfolio. This due to small investors being slow to sell loser portfolios in optimistic periods because it contradicts the general sentiment and thus causes cognitive dissonance. On the other hand, large investors respond more quickly to negative information by looking at intraday transaction which shows that in formation periods, large investors are not sellers. They also note that investor sentiment does not overlap with market states. When market is trending up (trending down), that does not mean the sentiment is optimistic (pessimistic).[35] Acquisition price has been argued to have an anchoring effect on investors when they buy and sell stocks. George and Hwang (2004) showed that 52-week high reference point is more significant in investor decision making. Birru (2015) established the effect that demand has on capital gain and loss. They argue that increased (decreased) demand for stocks trading at capital loss (gain) due to disposition effect causes stocks to move away from their equilibrium prices. This effect when controlled for can predict future returns.

Other scholars have studied the effect of market states and liquidity on momentum returns. Avramov et al. (2016) show that there is a negative effect of market illiquidity on momentum returns. They also show that momentum is lower when the market is down and also when volatility is high. During market illiquidity, loser portfolio is more effected by it than winner portfolio. They show that when markets are liquid, price continuation dominates the cross-sectional liquidity effect, thus generating positive momentum returns. However, when markets are illiquid, the liquidity gap between winner and loser portfolio reduces momentum returns as the loser portfolio earns higher subsequent returns. Trading volume has also been linked to predict future returns. Lee and Swaminatha (2000) show that past trading has the power to predict the magnitude of future returns. High and low volume have different effects on winners and losers. They show that high volume winners and low volume losers have quicker reversal. Low volume losers' future returns are significantly higher than high volume losers. Low volume stocks that experience high future returns is related to misperceptions from investors

[35] They analyse the post earnings announcement drifts effect on cognitive dissonance during optimistic and pessimistic periods. They show that it when the surprise sign contradicts the current sentiment, it strongly affects future returns. In their results, they show that when there is a negative surprise during optimistic period, it is 11% lower. Their results suggest that market underreacts to news when it contradicts the current market sentiment. They also analyse whether momentum is driven by the winner or the loser portfolio. They show that momentum during optimistic periods is driven by cognitive dissonance of bad news in the loser portfolio.

about future earnings. Analysts lower long term earnings growth forecasts for low volume stocks, in which they experience better operating performances.

4.3 Research motivation

Other research has incorporated investor sentiment, momentum and the 52-week high strategy to see how integrating all three variables together affects future returns. Hao et al. (2018) test how momentum and 52-week high perform in different investor sentiment periods. They hypothesise that investor decisions are subject to behavioural biases when investor sentiment is high, which in turn leads to higher returns on both momentum and 52-week high strategies. Their findings support the anchoring theory in explaining the 52-week high returns. Their results also show that following high investor sentiment periods, the 52-week high strategy yields high returns (1.396% average monthly returns). However, following low sentiment periods, 52-week high returns are insignificant (0.056% average monthly returns). They document that the returns following high sentiment periods persists up to five years. Since their findings are driven by anchoring bias, they reject the theory of Hong and Stein (1999) suggesting that momentum is driven by slow diffusion of information. In their finding, Hao et al. (2018) report that the winner portfolio yields positive returns regardless of the sentiment period. Their results also show that in low sentiment years, loser portfolios report positive significant returns. Overall, their results show that in high sentiment periods, winner portfolios – that is, stocks that are close to their 52-week high – report positive significant returns, while loser portfolios – stocks that are far from their 52-week high – report positive insignificant returns. The difference between the winner and loser groups is significantly positive in high sentiment periods.

In low sentiment periods, the winner portfolio yields positive significant returns that are higher than those of the winner portfolio in high sentiment periods. The loser portfolio also reports significantly higher returns in low sentiment periods than in high sentiment periods but the difference between the two yields negative significant returns in low sentiment periods. They also find that JT price momentum does not differ when implemented in high or low sentiment periods. Their findings contradict those of Antoniou et al. (2013). Hao et al. (2018) believe that the price momentum returns are subsumed by those of the 52-week high strategy and that the 52-week high plays a dominant role in momentum investing following high sentiment periods and is a better predictor of future returns. However, they confirm the findings of Antoniou et

al. (2013) that returns from the winner portfolio in a price momentum strategy decrease as sentiment increases. Hao et al. (2018) also show that the winner group in a 52-week high strategy has a positive relationship with investor sentiment. Winners yield higher returns when sentiment is high. Loser stocks in the 52-week high strategy report negative returns that persist for longer, since investors are slow to sell their losing stocks when sentiment is high, as it contradicts the current sentiment. In price momentum strategy of Jegadeesh and Titman (1993), the long term reversal is part of the momentum cycle theory (Hong and Stein, 1999). However, this does not apply on the 52-week high strategy as returns persist for up to 5 years following high sentiment periods. They conclude that the source of the 52-week high strategy and price momentum is likely to be different, because returns pattern differ conditional on investor sentiment. Not all 52-week high stocks are considered as winners or losers by Jegadeesh and Titman (1993) or Hong and Stein (1999). Thus, the 52-week strategy and the momentum strategy capture different aspects of future returns and must not be considered as one phenomenon that predict future returns and are driven by the same set of variables.

This work augments that of Hao et al. (2018) on the premise that 52-week high strategy and price momentum strategy are different phenomenon and thus they are driven by different sources. It asks whether 52-week high returns and price momentum returns respond differently to investor sentiment and specifically whether the anchoring bias overtakes the underreaction in momentum strategies. It does this by conducting a pairwise analysis and double sorting analysis. In the first analysis, the strategy of 52-week high and price momentum is implemented on the overall market to establish their existence. A double sorting analysis is conducted in two ways. First, by sorting by nearness to the 52-week high and then past returns; second, by sorting first by past returns and then 52-week high.

4.4 Research question and hypotheses

4.4.1 Research question

This chapter ask questions about the relation between momentum returns, 52-week high returns and investor sentiment. The questions proposed are:

1. How does investor sentiment affects momentum returns?
2. How does investor sentiment affect 52-week high returns?

3. How does investor sentiment affect both momentum and 52-week high returns simultaneously?
4. Does disposition effect, anchoring effect and cognitive dissonance affect future returns at the same degree?

4.4.2 Hypotheses

H_1: investor sentiment has a positive relationship with momentum returns.

H_2: investor sentiment has a negative relationship with 52-week high.

H_3: Investor sentiment predicts (and not predicts) future returns in the double sorting strategy.

H_4: Investor sentiment affects (and not affects) stocks based on their position form 52-week high.

H_5: Investor sentiment affects (and not affects) stocks based on their past returns.

4.5 Data and methodology

4.5.1 Data

The first two main variables for this study are monthly and daily prices and returns, derived from CRSP for all stocks in the database from 1965 to 2018. Even though end-of-month prices give us the end price for each stock, it is not sufficient to know the highest price for that stock in that month. Therefore, daily prices are also collected for all stocks in the dataset to precisely calculate the nearness to the 52-week high by looking at the end-of-day (closing) price for each stock. Even though the end-of-day price may not be the highest price for that day, it is more accurate than end-of-month prices. Investor sentiment data from 1965 to 2018 is collected following Baker and Wurgler (2006) in which they form a composite index of sentiment based on the common variation in six underlying proxies for sentiment: the closed-end fund discount, NYSE share turnover, the number and average first-day returns on IPOs, the equity share in new issues, and the dividend premium.

4.5.2 Methodology

4.5.2.1 Momentum

Since the interest is in knowing whether the 52-week high returns are driven by other factors, whether the 52-week high prices are driven by momentum will first be examined. Implementing this strategy at the beginning of the analysis will give a general idea of whether

the overall market exhibit momentum. This starts by ranking stocks based on their past returns following the methodology of Jegadeesh and Titman (1993). Stocks are ranked based on their past returns into 10 deciles. Stocks within the top three portfolios (30%) will be assigned to the winner portfolio and stocks within the bottom three portfolio (30%) will be assigned to the loser portfolio. The momentum strategy uses an overlapping portfolio, which means that at any given month t, the strategy holds a series of portfolios that have been selected in the current month and portfolios in $K-1$ months (K is the holding period). Stock returns from time t to $t+J$ are examined (J is the observation period). At a given month $t+J$, all stocks are ranked based on their past returns. Ten portfolios are formed based on deciles, where the top 30% is the winner portfolio and the bottom 30% is the loser portfolio. A set of different combinations of momentum strategies are implemented where stocks are observed for 12 months and held for 3, 6, 9 and 12 months. Momentum returns are the difference between the mean returns of the winner portfolio and loser portfolio over time.

4.5.2.2 52-week high

Additional to investigating momentum in the market, this chapter examines whether proximity to the 52-week high affects investor decisions to buy/sell stocks that are near or far from a statistical benchmark. George and Hwang (2004) find that the 52-week high price–explains a large portion of the profits from momentum investing and that the nearness to the 52-week high dominates and improves upon the forecasting power of past returns for future returns. The 52-week high for each stock in each month from 1965 to 2018 is first calculated. The daily price for each stock is used to generate the highest price for the stock in that specific month. Then at any given month t, the previous 12 months are examined and the highest price from the past 12 months is the 52-week high price for each specific stock. The nearness of the 52-week high is then calculated using the following formula:

$$\text{Nearness of 52 week high} = \frac{P_{i,t-1}}{High_{i,t-1}}$$

Where $P_{i,t-1}$ is the price of stock i at the end of month $t-1$, $High_{i,t-1}$ is the highest price of stock i during the 12-month period that ends on the last day of month $t-1$. For each month all stocks are ranked based on the nearness of their 52-week high. Stocks in the top 30% will be assigned to the 'near' portfolio and the bottom 30% will be assigned to the 'far' portfolio. Generally, the 52-week strategy does not necessarily short stocks that are far from their 52-

week high, but in this strategy, analysis examines both the near and the far from the 52-week high to understand the behaviour of stock prices near/far from this major reference point.

4.5.2.3 Investor sentiment

After establishing the overall market exhibit momentum and 52-week high excess returns, attention moves to investor sentiment. Although investor sentiment is not company-specific but rather time-series-based, Antoniou et al., (2013) present a unique methodology of using a weighted moving average for investor sentiment that changes every month based on the past j months but gives more weight for the most recent sentiment. At any given month t, it look to month $t-j$ to create the weighted average sentiment index by assigning K/J for the most recent month $t-1$, $K-1/J$ for $t-2$, and $K-2/J$ for $t-3$. Baker and Wurgler (2007) create an investor sentiment index that is based on 6 different variables that they believe is an accurate assessment of investor sentiment in the US market (see above). They also provide the data for it from 1965 to the present day.

4.6 Empirical results

4.6.1 Market momentum

This section will investigate whether the overall market exhibits momentum returns. It will run a momentum strategy by first ranking all stocks based on their past returns and then assigning stocks into deciles. The market is split into three different portfolios. The winner (loser) portfolio contains the top (bottom) 30% stocks that have been winning (losing) in the past J months. The mean average difference between the winner and loser portfolios over the holding period is the momentum returns. analysis runs 4 different strategies based on a 12-month observation period and holding periods of 3, 6, 9 and 12 months. Table 4.1 shows the results for all the different strategies. All strategies have an observation period of 12 months because the 52-week strategy utilises 12 months of observations to calculate the highest price (52-week high). In this way, to ensure that the results between momentum and 52-week high are comparable.

Table 4.1
Market momentum

Cross-sectional momentum is formed based on an observation period J months and holding period K months. J and K represent the different observation and holding period strategies. Stocks are ranked based on their past performance over J months in ascending order. 3 equally weighted portfolios are formed based on the past J months performance. P1 is the loser portfolio and P3 is the winning portfolio. Stocks with the most returns over the observation period J months (P7) are bought and stocks with the lowest performance over J months is sold (P3). The average monthly returns are presented in this table. The sample period is January 1965 to December 2018. Optimistic and pessimistic periods are formed following Antoniou et al. (2013).

Portfolio	***K***	3	6	9	12
Market	L	0.0066	0.0074	0.0084	0.0093
	W	0.0127	0.0120	0.0116	0.0111
	W-L	0.61%	0.46%	0.32%	0.17%
	Ann	7.55%	5.66%	3.85%	2.11%
Optimistic	L	-0.0042	-0.0035	-0.0001	0.0002
	W	0.0067	0.0078	0.0082	0.0078
	W-L	1.09%	1.13%	0.83%	0.75%
	Ann	13.91%	14.50%	10.36%	9.43%
Pessimistic	L	0.0193	0.0208	0.0162	0.0151
	W	0.0180	0.0189	0.0171	0.0170
	W-L	-0.13%	-0.19%	0.09%	0.19%
	Ann	-1.60%	-2.24%	1.08%	2.32%

In table 4.1 are momentum returns from January 1965 to December 2018 following the Jegadeesh and Titman (1993) method.[36] The results show that the market exhibits positive momentum returns across during the whole period. Momentum returns are at their highest when holding for 3 months with 0.61% average monthly momentum returns (7.55% annual returns). As the portfolios are held for longer, the momentum returns decrease. Holding for 12 months yields 0.17% average monthly returns (2.11% annual return). These results are aligned with Jegadeesh and Titman (1993), who state that momentum returns decrease as the holding period is extended from 3 to 12 months. The loser portfolio yields positive returns in all the holding periods and increase as the holding period increases. On the other hand, the winner portfolio also exhibits positive returns that decreases with the holding period and, thus, overall

[36] The momentum strategy implemented uses overlapping portfolios, whereby in any given month t, the strategy holds a series of portfolios that have been selected in the current month and portfolios in $K-1$ months (K holding periods). It looks at stock returns from time t to $t+J$ (J observation periods). As stated above, the observation period will always be 12 months. At a given month $t+J$, ranking all companies based on their previous returns. Three portfolios are formed based on deciles, where P1 is the top 30% (winner portfolio) of all companies based on their returns and P3 is the lowest 30% (loser portfolio). The momentum strategy that observe stocks for 12 months and hold portfolios for 3, 6, 9 and 12 months. The same strategy is repeated for each month to create overlapping portfolios. Portfolio average monthly return is the mean return of all the overlapping portfolios that is held at time anytime t. Momentum returns is the difference in mean returns between the winner and loser portfolios across the period.

momentum returns decrease at longer holding periods. Both the increase in the loser returns and the decrease of the winner returns contribute to a decreasing momentum returns as portfolios held for longer. Loser portfolio reversal could be attributed to overreaction and the fact that investors would sell losers beyond their equilibrium price, which triggers a reverse buying when investors realise that prices are far from fundamental values.

To investigate the effect of market sentiment on future returns, table 4.1 also reports momentum portfolio returns across different sentiment states. A period is classified as optimistic or pessimistic when all of the past K months, which changes depending on the holding period, were optimistic or pessimistic. During optimistic periods, it shows that momentum returns increase dramatically. Holding for 6 months yields the highest momentum return in optimistic periods, with a 1.13% monthly return (14.5% annual return), while holding for 12 months yields the lowest one, with 0.75% monthly returns (9.43% annual returns). The loser portfolio has negative returns in all holding periods except when holding for 12 months, but the negative returns become less negative as the portfolio is held for longer. The loser portfolio produce such results because investors are slow to sell their losing stocks in an optimistic period since it contradicts the general sentiment of the market (Antoniou et al., 2013). This is due to the cognitive dissonance effect, in which investors get confused when the news contradicts the market's sentiment, thus slowing down the diffusion of such information. In this case, the loser portfolio contains stocks that have experienced a series of bad news and they therefore have been losing for the past 12 months. Since the sentiment is optimistic, investors are slow to act on further bad news. Another important result here is that the optimistic sentiment reinforces the disposition effect on the losing side which makes investors less keen to sell in the hope that positive news about market overall will help minimise their losses. Interestingly, investors start to change their opinion about the bad news of the stock during the optimistic period and the returns increase overtime. On the other hand, the winner portfolio returns are positive and increase as the portfolio is held for longer. The winner portfolio has received a series of good news, and, thus, when the news is in sync with the current sentiment the price reflects the news very quickly. However, the winner portfolio continuation during an optimistic period is considerably less than the winner portfolio returns documented during the whole sample.[37] This means that investor sentiment attenuates the

[37] There is no confusion of cognitive dissonance with good news during optimistic period and that is why observable returns of the winner portfolio during optimistic period is less than those of the general winner portfolio returns when it does not consider investor sentiment. The difference is almost 50% less during optimistic periods.

disposition effect on the winning side and makes investors less reluctant to buy winning stocks when further good news is announced, leading to quick price adjustments and smaller winner portfolio return continuations. The results so far indicate that momentum during optimistic periods are driven by the loser portfolio rather than the winner one.[38]

Looking at the pessimistic periods, it shows that momentum is low negative at shorter holding periods (3 and 6 months) but low positive at longer periods (6 and 12 months). The loser portfolio yields positive reversing returns that decrease with the holding period. Losing stocks have experienced increased selling pressure during the observation period which turns into a buying one during the holding period. Here, further bad news will be in sync with the current sentiment and investors would react to it as it arrives. Thus, during a pessimistic period, further bad news will diffuse quickly and investors will act upon it in a timely manner. The strong reversal of the loser portfolio reduces momentum returns during the pessimistic period. Regarding the winner portfolio, it yields high positive returns that decrease slightly with the holding period. The winner portfolio returns during the pessimistic period are also significantly higher than the winner portfolio returns over the optimistic and the whole periods. The winner portfolio has had a series of good news but any further good news will contradict investors' pessimistic sentiment and will not be reflected on the stock price quickly. This is consistent with cognitive dissonance effect which slows the diffusion of information when news contradicts the current market's sentiment. More importantly, the pessimistic sentiment reinforces the disposition effect on the winning side which makes investors more reluctant to buy in the fear that negative news about market overall will eradicate their capital gains.

This result show that investor sentiment has a significant impact on momentum returns. In particular, during optimistic periods, momentum portfolios yield more than double the return generated during the whole period due to the loser portfolio continuation, while in pessimistic periods, the impact of investor sentiment eliminates momentum from the market hugely due to the loser portfolio reversal. In the optimistic period, investors are reluctant to sell losers as it is

This is due to the quick diffusion of information and the fact that investors do not need a lot of time to analyse or comprehend the news when it is in sync with the current sentiment.

[38] This further confirms the finding of Antoniou et al. (2013) that momentum is driven by the loser portfolio during optimistic sentiment periods and by the winner portfolio during pessimistic sentiment periods. This result show that the loser portfolio yields high reversing returns during the overall period compared to the return continuation during the optimistic period. More, the winner portfolio exhibits higher return continuations over the whole period compared to significantly smaller returns continuations during the optimistic period. Thus, momentum is higher during optimistic periods due to the fact that the loser portfolio continues to lose, and the winner portfolio continues to win, unlike the overall period when the loser portfolio actually reverses and yields positive returns.

opposite to the current market sentiment and so the loser portfolios continue to lose. This action makes momentum strategy profitable. In pessimistic periods, the loser portfolio returns reverse strongly, while the winner portfolio continuations are also strong and positive, thus, producing low positive and low negative momentum returns. Overall, it seems that investor sentiment not only has a significant impact on loser (winner) portfolio returns during optimistic (pessimistic) periods (through the cognitive dissonance effect) but also reinforces the disposition effect which makes investors more reluctant to sell (buy) losing (winning) stocks during optimistic (pessimistic) market states.[39]

4.6.1.1 52-week high

The 52-week strategy is implemented by first calculating the nearness of the 52-week high for all stocks in the market at each month t by using the nearness of 52-week high formula described in the methodology section. All stocks are ranked in the market based on their nearness of the 52-week high to create three portfolios: the top 30% portfolio containing stocks that are close to their 52-week high, the bottom 30% of stocks that are the far from their 52-week high, and the middle 40% of stocks that are the neutral stocks. Since this is an overlapping strategy, the same exercise is repeated for every month. The strategy buys (sell) the near (far) portfolio and hold it for 3, 6, 9 and 12 months. Table 4.2 reports the results for the 52-week high strategy. The existing literature has extensively studied this strategy and established that stocks that are close to their 52-week high yield higher returns and positive alphas (George and Hwang, 2004). For example, a stock whose price is close to its 52-week high is a stock for which good news has recently arrived. Investors who buy stocks that are near their 52-week high might be biased in how they react to news, especially if they use it as a reference point or an anchor. Profits of a momentum strategy might be at their highest.

[39] Investor sentiment is only a proxy for the cognitive dissonance that effects the speed of information diffusion. When the news is in sync with the current sentiment, investors would react upon it with ease and in a timely manner, since it is in line with what they believe at the moment. However, when the news contradicts the current sentiment, investors would need to change their opinion which takes time and, thus, it is observable the continuation in prices. This result confirms these findings by showing that the winner portfolio returns is at its highest when the sentiment is pessimistic, and at its lowest when the sentiment is optimistic. In the case of the loser portfolio, it yields its highest continuation when considering the optimistic period and its lowest during the pessimistic period.

Table 4.2
52-week high

The cross section of 52-week high returns is formed based on an observation period 12 months and a holding period of *K* months. Stocks are ranked based on their nearness to their 52-week high over the past 12 months in ascending order. 3 equally weighted portfolios are formed based on the past 12 months nearness of 52-week high. P3 is the far portfolio and P1 is the near portfolio. Stocks that are the closest to their 52-week high are bought and stocks that are the farthest from 52-week high are sold. The average monthly returns are presented in this table. The sample period is January 1965 to December 2018. Optimistic and pessimistic periods are formed following Antoniou et al. (2008).

Portfolio	***K***	3	6	9	12
Market	F	0.0054	0.0065	0.0075	0.002
	N	0.0111	0.0121	0.0117	0.0048
	N-F	0.56%	0.56%	0.42%	0.28%
	Ann	6.95%	6.99%	5.22%	3.40%
Optimistic	F	-0.007	-0.0061	-0.0001	0.002
	N	0.009	0.011	0.0131	0.0139
	N-F	1.71%	1.71%	1.32%	1.19%
	Ann	22.58%	22.55%	17.04%	15.29%
Pessimistic	F	0.0210	0.0213	0.0143	0.0154
	N	0.0153	0.016	0.0146	0.0151
	N-F	-0.57%	-0.53%	0.03%	-0.03%
	Ann	-6.64%	-6.21%	0.39%	-0.33%

To establish whether this is true for this dataset, the 52-week strategy is implemented on the whole period and then controlled for periods of optimistic/pessimistic investor sentiment. The results, reported in table 4.2, show that the 52-week high strategy yields positive returns in the overall market from 1965 to 2018. Holding portfolios for shorter periods (3 and 6 months) yields higher returns than holding it for longer. The highest return is documented for the 6-month holding period, with 0.56% average monthly returns (6.99% annual returns). Holding for 12 months would yield 0.28% monthly (3.4% annual return). The portfolio of stocks that are far from their 52-week high produces positive returns that increase as the holding period increases, while the near portfolio returns decrease as the holding period is increased. The disposition effect is likely to be stronger if investors anchor on the 52-week high or low. For example, traders are more reluctant to buy (sell) stocks that are close to their 52-week high (low) when further good (bad) news arrive. Thus, the 52-week high strategy will generate strong near and far portfolio return continuations and, as a result, lead to higher profits from 52-week high momentum investing. The near portfolio behaviour also relates to the recency effect of Bhootra and Hur (2013). Bhootra and Hur (2013) state that stocks that have recently reached their 52-week high yield higher returns than stocks that have been near their 52-week high for longer. Thus, the near portfolio returns decrease over time as the portfolio is held for

longer. The far portfolio, on the other hand, shows strong reversals. This could be attributed to increased selling pressure of stocks that are far from their 52-week high and possibly priced below their long-run or fundamental values. An increased demand for stocks trading at a capital loss will make the reversal more imminent.

When controlling for investor sentiment, the results change dramatically. In optimistic periods, the 52-week high returns increase more than three times over the 52-week high return for the whole period. In an optimistic period, when holding the portfolio for 3 months, the strategy yields 1.71% average monthly returns (22.58% annual return). Holding the strategy for 12 months would yield 1.19% average monthly returns (15.29% annual return). Stocks that are far from their 52-week high (far portfolio) yield negative returns that decrease as the portfolio is held for longer. In optimistic periods, investors are slow to short stocks that are far from their 52-week high either due to the cognitive dissonance effect or due to the stronger disposition effect (from the induced anchoring). In particular, further bad news about the far portfolio stocks will contradict the positive investor sentiment and investors will be reluctant to act upon the new information, thus, making the incorporation of bad news into prices slow. Anchoring is also a behavioural bias that makes the disposition effect stronger and, in this particular setting, investors will be more reluctant to sell far portfolio stocks if they believe that their prices cannot fall any further or that they already trade at a significant capital loss. Importantly, here also the optimistic sentiment reinforces the disposition effect on the far portfolio side which makes investors less keen to sell in the hope that positive news about the market overall will help minimise their losses. The near portfolio, on the other hand, shows increasing positive returns as the portfolio is held for longer.[40] The disposition effect is also more pronounced when stocks trade close to their 52-week high. Investors are reluctant to buy near portfolio stocks when further good news arrive and if they believe that prices cannot surpass the 52-week high reference point. Here, the positive market sentiment is in sync with good news of the near portfolio stocks and thus investors are likely to continue pushing stock prices in the same direction.

This is a novel finding that adds to the findings of Antoniou et al. (2013). Investors are reluctant to act when market sentiment is opposite to the stock price movement (or new information arrival), but they also continue pushing the stock in the same direction when the market

[40] This is contradictory to the recency effect as investors continue buying the stocks that are close to their 52-week high in an optimistic period.

sentiment is in sync with stock price movement as this result show. During the optimistic period, near portfolios do experience anchoring and disposition effect, but it does not experience cognitive dissonance effect since price movement, which is driven by news is in sync with the current sentiment. When comparing the returns of the near portfolio during optimistic period and the overall period, it shows that the positive sentiment makes investors more reluctant to hold near portfolio stocks for long time. Although, news should diffuse quickly when investor sentiment agrees with new information, anchoring will hold investors back in terms of buying near portfolio stocks when further good news arrive, especially at longer investment horizons.

In pessimistic periods, the 52-week strategy returns are highly negative for the 3/6 month holding period and close to zero for the 9/12 month holding period. The 52-week high momentum strategy yields negative returns in pessimistic periods, which is in line with the existing literature (Hao et al., 2018). The near portfolio returns are positive and only change slightly over the different holding periods. During pessimistic periods, the near portfolio generates the highest positive returns when compared with the near portfolio performance during the whole and optimistic periods. Stocks that trade close to their 52-week high have recently received some good news, while further good news on the same stocks will be in contrast with investors' pessimistic sentiment. The cognitive dissonance effect combined with the strong disposition effect (due to anchoring) explain the strong return continuations of the near portfolio during pessimistic periods.[41] The far portfolio, during pessimistic periods, generates highly positive reversing returns that decrease slightly at longer holding periods. It seems that investors exercise strong selling pressure when far portfolio stocks receive further bad news especially during a pessimistic market state. When news is in sync with the current sentiment, investors act upon it in a timely manner and information diffuses quickly. Often, they will even push prices away from its long-run values to a point that the reversal is imminent. The far portfolio, during pessimistic period, also experiences a strong disposition effect (due to anchoring) but it is not strong enough to prevent investors from selling the stock in the same direction with the news or the market's pessimistic sentiment. As a result, it shows that the far

[41] For the near portfolio, news contradicts the current sentiment, and thus, investors experience cognitive dissonance which makes them slow to react to new information. This slow reaction creates the continuation in stock returns that is observable in the near portfolio during pessimistic periods. Near portfolio returns, during pessimistic periods, are significantly higher than both during optimistic and overall period. This result indicates a strong cognitive dissonance effect on stock returns continuations.

portfolio is reversing during pessimistic periods.[42] Overall, the effect of investor sentiment is pronounced when sorting by both past returns and 52-week high. During the optimistic period, momentum is higher because it is driven by the loser portfolio continuation and momentum is lower during pessimistic period due to the loser portfolio reversal.

4.6.1.2 Strategy combination

4.6.1.2.1 Momentum over 52-week high

To establish that the momentum returns and 52-week high returns are different phenomena and are driven by different sources, a double sorting strategy is used that considers both past returns and 52-week high. First, stocks are ranked by past return performance and then by nearness to their 52-week high. Second, stocks are ranked by nearness to 52-week high and then by the past return performance. In this section, the results of the first double sorting are considered.[43] Within the winner and loser portfolio the nearness of the 52-week high is controlled for by ranking stocks within each (loser or winner) portfolio based on their nearness of the 52-week high. This ranking will give four different categories: winner stocks that are near their 52-week high, winner stocks that are far from their 52-week high, loser stocks that are near their 52-week high and loser stocks that are far from their 52-week high. The strategy is implemented for different holding periods of 3, 6, 9 and 12 months. Table 4.3 shows the results for this strategy.

The results show that the 52-week high strategy within the winner portfolio yields positive returns over the different holding periods. The near minus far strategy returns, within the winner portfolio stocks, increase as the strategy is held for longer. The highest return, 0.41% average monthly (4.98% annually), is evidenced for the 9-month holding period, while, the lowest return, 0.28% average monthly (3.35% annually), is evidenced for the 3-month holding period. Interestingly, sorting past winner stocks based on their proximity to the 52-week high generates some extra positive returns for the near minus far portfolio that also increase with the holding period. The winner portfolio of the overall market and across the whole period yields positive decreasing returns as the portfolios is held for longer (see table 4.1). The

[42] The results show that 3 months after formation period, far portfolio experience reversal, which means that investors would have pushed the stock price very far away from its equilibrium price to see such big reversal after only 3 months of holding period.

[43] Following the methodology of Jegadeesh and Titman (1993), stocks are first ranked based on their past returns and assign them into three portfolios based on their returns. The top 30% will be assigned to the winner portfolio; the bottom 30% will be assigned to the loser portfolio. 30% was chosen instead of the 10% usually used in the JT method to include more stocks in the portfolios as they are sorted again by their nearness of the 52-week high.

magnitude of the near portfolio returns are bigger than the far portfolio ones, within the winner portfolio, indicating that anchoring (and its influence on the disposition effect) contribute to higher return continuations for stocks that are near compared to far from their 52-week high.[44] These results show that investors are not only interested on the stocks' past performance, but they would also act on information related to the stock's position relative to its 52-week high.

Table 4.3

Momentum over 52-week high

In this analysis first sorts by past returns (12 months). It then divides the market into three deciles top 30% and bottom 30%. Within the winner and loser portfolio, it sorts by the nearness of the 52-week high. It reports the near and far portfolios return within the winner and loser portfolio. The near and far portfolio represents top 30% and bottom 30%. This is run for the period from 1965 to 2018.

Portfolio	***K***	3	6	9	12
	52-week				
Winner	Far	0.0105	0.0094	0.0086	0.0081
	Near	0.0133	0.0131	0.0127	0.0122
	N-F	0.28%	0.37%	0.41%	0.40%
	Ann	3.35%	4.52%	4.98%	4.95%
Loser	Far	0.0072	0.0066	0.0073	0.0083
	Near	0.007	0.0083	0.0089	0.0101
	N-F	-0.01%	0.17%	0.16%	0.18%
	Ann	-0.17%	2.09%	1.98%	2.23%

Implementing a 52-week high strategy on the loser portfolio stocks yields increasing but small returns. In shorter periods, the strategy yields negative returns that turn positive as the portfolio is held for longer. The highest returns come when holding the (near minus far) strategy for 12 months at 0.18% average monthly returns (2.23% annually), while the lowest returns come when holding the strategy for 3 months at -0.01% average monthly return (-0.17% annually). Both the near and far portfolios with the loser portfolio stocks yield positive returns, while the near portfolio has slightly higher returns than the far portfolio that also increase with the holding period. Interestingly, the far portfolio exhibits (slightly) lower return reversals than the near portfolio ones. Anchoring and the disposition effect, which are more pronounced on the far portfolio, would prevent investors from exercising increased selling pressure. The loser portfolio returns for the overall market and across the whole period are positive and increasing with the holding period. Moreover, the magnitude of returns for the far and near portfolios,

[44] Investors exhibit a set of behavioural biases in this particular setting. Since this is a winner portfolio and sorted by the nearness of the 52-week high, the disposition effect is reinforced by the anchoring effect. Theory suggests that both biases will prevent stocks from quickly adjusting their prices in the direction of news. In this example, it applies more to the near portfolio compared to the far one since the anchoring effect is strong for stock that trade close to their 52-week high.

within the loser portfolio stocks, are very similar to the overall losers' portfolio returns. This result show that, on the losing side, a further partition of stocks based on their proximity to the 52-week high would produce near minus far portfolio returns that are significantly low. On the losing side, investors are primarily driven by past return performance, while the proximity of stocks to their 52-week high is marginally important for the far portfolio stocks (due to smaller return reversals).

In summary, comparing the near and far portfolios within the winner portfolio and the winner portfolio of the overall strategy gives us a good insight on what drives the winner's momentum returns. First, implementing a 52-week (near minus far) strategy within the winner portfolio enhances the returns of the overall winner portfolio (by almost 5% annually on the 9-month holding period). Moreover, applying a 52-week (near minus far) strategy within the loser portfolio improves the returns of the overall losing portfolio only marginally (by almost 2.23% annually on the 12-month holding period). This indicates that investors on the winning side pay attention not only on the stocks' past performance but also on the stocks' position relative to their 52-week high. On the losing side, investors are primarily interested in the stock's past performance, while closeness to the 52-week high is only marginally considered for stocks that are far from the reference point. Finally, anchoring and its impact on the disposition effect seems to be more prevalent on near portfolio within the winner stocks and less on the far portfolio with the loser stocks.

Next, whether investor sentiment affects the near and far portfolios returns either within past winners or within past losers is examined.[45] Table 4.4 shows the results for optimistic and pessimistic periods of the winner portfolio. During an optimistic period, results show that within the winner portfolio, buying stocks that are near their 52-week high and selling stocks that are far from their 52-week high yields highly positive returns. The near minus far portfolio returns stay highly positive for holding periods up to 9 months. The highest return from this strategy is observed for the 6-months holding period at 1.03% average monthly return (13.03% annually) and the lowest one is observed for the 12-month holding period at 0.63% average monthly returns (7.82% annually). Looking at the far and near portfolios within the winner stocks gives us a better understanding of the results. The far portfolio (stocks that are far from

[45] This is achieved by creating the weighted average investor sentiment for each month t following the methodology of Antoniou et al. (2013). Baker and Wurgler (2006) created the investor sentiment index and assigned an investor sentiment score for each month and a weighted average score is created by assigning more weight for the most recent sentiment and less weight for past sentiments.

their 52-week high) shows positive returns that increase as the holding period increases. The near portfolio also has positive and increasing returns throughout the different holding periods, but their size is significantly higher than the far portfolio returns. Since the far portfolio returns remain relatively small compared to near portfolio ones for holding periods up to 9 months, a 52-week high (near minus far) strategy gives high and positive returns for the same period. Stocks that are winners for the past 12 months and recently received good news (or are close to their 52-week high) show mild return continuations following optimistic sentiment periods, which are consistent with the anchoring effect and the impact it has on the disposition effect. This also indicates that during optimistic periods, investors pay extra attention to the position of stocks from their 52-week high, as they anchor and use it as a reference point for buying and selling, rather than just using past returns.[46]

Table 4.4

Momentum over 52-week high (winner portfolio)

In this analysis it looks at the winner portfolio sorted by past returns (12 months). It then divides the market into three deciles top 30% and bottom 30%. Within the winner and loser portfolio, sort by the nearness of the 52-week high. It reports the near and far portfolios return within the winner and loser portfolio. The near and far portfolio represents top 30% and bottom 30%. Investor sentiment rolling average is used developed by Antoniou et al. (2013). Weights are assigned for each month on the past three months to measure current month's sentiment. Analysis run this for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
Optimistic	52-week Far	0.0009	0.0017	0.0023	0.0079
	Near	0.0107	0.012	0.0120	0.0142
	N-F	0.97%	1.03%	0.97%	0.63%
	Ann.	12.32%	13.03%	12.30%	7.82%
Pessimistic	Far	0.0199	0.0196	0.0162	0.0158
	Near	0.0173	0.0181	0.0171	0.0177
	N-F	-0.26%	-0.15%	0.09%	0.19%
	Ann.	-3.13%	-1.78%	1.09%	2.34%

Moreover, the optimistic investor sentiment not only attenuates the return continuations of past winning stocks that also trade close to their 52-week (news agree with market sentiment and

[46] This means that in an optimistic period, investors pay attention to the position of both the winner stocks and their position from their 52-week high. Investors are more (less) reluctant to buy past winning stocks that also trade close (far) to (from) their 52-week high. The distinction between near and far portfolios within past winners is very important during optimistic periods. This result is novel to the current literature, as it believed that generally stocks yield more returns based on their nearness to the 52-week high and not to their past returns as well. The double sorting, first by past winners and second by nearness of the 52-week high, enhances the returns of the overall past winner strategy.

prices adjust quickly) but further eliminates the return continuations of past winning stocks that also trade far from their 52-week high.

In a pessimistic period, implementing a 52-week high (near minus far) strategy within the winner portfolio yields negative returns for shorter periods that turn to positive for holding periods of 9-months or more. The lowest (highest) return is documented when holding for 3 (12) months at -3.13% (2.34%) annual return. The far portfolio returns are positive and decrease with the holding period, while the near portfolio ones are positive and increase at longer periods. The near portfolio returns are slightly lower (higher) than the far portfolio returns for the 3-(9-) and 6-(12-) month holding periods. This makes the 52-week high (near minus far) strategy, within the winner portfolio, negative for shorter and positive for longer holding periods. Both the far and near portfolio, within the winner portfolio, report similar returns to the overall winner portfolio during pessimistic periods. Stocks that are winners for the past 12 months and recently received good or bad news (or are close to or far from their 52-week high) show strong return continuations following pessimistic sentiment periods. This result is consistent with the disposition effect and the cognitive dissonance effect. In particular, the pessimistic investor sentiment enhances return continuations of past winning stocks regardless of having received either good or bad news recently (news contradicts the current market sentiment and prices adjust slowly).[47] In pessimistic periods, investors are more reluctant to buy past winning stocks, when further good news arrive, and it seems that investor sentiment not only enhances the disposition effect but also overrides the anchoring one as well.[48]

Now, attention will be turned to the loser portfolio in implementing the 52-week strategy. Table 4.5 below reports the results for implementing the 52-week high strategy within the loser portfolio in both optimistic and pessimistic periods. First, the optimistic period is discussed. Implementing the 52-week (near minus far) strategy within the loser portfolio yields highly

[47] The results indicate that in pessimistic periods, when the stock is winning investors pay less attention, or are reluctant to act upon, the price relative to its 52-week high. Neither near nor far position affects stocks that are winning in pessimistic periods. This could be explained by the fact that in pessimistic periods, investors are eager to buy stocks that are winning regardless of being far from or near their 52-week high.

[48] In this analysis, there is more than one behavioural bias affecting future returns by either slowing or increasing the pace of information diffusion. These are disposition effect (Grinblatt and Han, 2005; Birru, 2015;), cognitive dissonance and anchoring (George and Hwang, 2004; Baker and Wurgler, 2006; Stambaugh et al., 2012; DeVault et al., 2019; and Antoniou et al., 2013). Scholars have studied these behavioural biases in isolation; however, there is a lack of studies on these biases in combination. This appears to be the case when the future returns of winner and loser stocks are tested whilst controlling from their position form its 52-week high during optimistic and pessimistic periods.

positive returns. The near portfolio yields positive returns that increase as the portfolio is held for longer. The far portfolio, on the other hand, shows strong negative returns that turn into small positive ones for the longest holding period. More, the far portfolio returns continuations contribute the most to the highly positive returns of the near minus far portfolio strategy during optimistic periods. Stocks that are losers for the past 12 months and recently received bad news (or are far from their 52-week high), show strong return continuations, following optimistic sentiment periods. This result is consistent with the anchoring effect, the impact it has on the disposition effect and the cognitive dissonance effect. In particular, the optimistic investor sentiment enhances return continuations of past loser stocks that have also recently received bad news (news contradicts the current market sentiment and prices adjust very slowly). In optimistic periods, investors are more reluctant to sell past losing stocks, that are also far from their 52-week high, when further bad news arrive, and it looks like, in this particular case, both investor sentiment and anchoring enhance the disposition effect. The results also indicate that the overall loser portfolio return, following optimistic sentiment periods, is driven by stocks that are also far from their 52-week high.

Table 4.5
Momentum over 52-week high (loser portfolio)

This analysis examines loser portfolio sorted by past returns (12 months). It then divides the market into three deciles top 30% and bottom 30%. Within the winner and loser portfolio, it sorts by the nearness of the 52-week high. It reports the near and far portfolios return within the winner and loser portfolio. The near and far portfolio represents the top 30% and bottom 30%. Investor sentiment rolling average developed by Antoniou et al. (2013) is used. Weights are assigned for each month on the past three months to measure current month's sentiment. This is run for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
	52-week				
Optimistic	Far	-0.0115	-0.0096	-0.005	0.0013
	Near	0.0008	0.0027	0.005	0.0074
	N-F	1.24%	1.23%	0.98%	0.61%
	Ann.	15.87%	15.75%	12.46%	7.55%
Pessimistic	Far	0.0239	0.0238	0.0172	0.0145
	Near	0.0146	0.0165	0.0138	0.014
	N-F	-0.93%	-0.73%	-0.34%	-0.04%
	Ann.	-10.59%	-8.45%	-4.02%	-0.53%

Importantly, past loser stocks that also trade close to their 52-week high exhibit small reversals, which indicates that anchoring is less pronounced when stocks have recently received some good news. In other words, investors are less reluctant to sell past losing stocks that recently also traded close to their 52-week high, following optimistic periods.

In a pessimistic period, the 52-week high (near minus far) strategy within the loser portfolio produces highly negative returns that decrease at longer holding periods. The far portfolio within loser stocks produces highly positive and reversing returns that decrease with the holding period. On the other hand, the near portfolio within loser stocks produces positive reversing returns that are persistent across the holding periods examined. As a result, it is observable that highly negative 52-week high returns for the 3 and 6-month holding periods, which become significantly smaller and negative for the 9 and 12-month holding periods. Stocks that are losing over the past 12 months and recently received bad news (or are far from their 52-week high), show strong return reversals, following pessimistic sentiment periods. More, the pessimistic investor sentiment enhances the return reversals of past losing stocks that also trade far from their 52-week (news agrees with market sentiment and prices adjust very quickly). This could be attributed to increased selling pressure of past losing stocks that also trade far from their 52-week high and are possibly priced below their long-run or fundamental values. An increased demand for stocks trading at a capital loss will make the reversal very imminent. In pessimistic periods, investors are less reluctant to sell past losing stocks that also trade far from their 52-week high, when further bad news arrives. Investor sentiment, in this example, agrees with the poor past return performance and the recently received bad news (far from the 52-week high), thus making the incorporation of new information into prices quick and weakening the disposition effect. Moreover, the return reversals of the near portfolio are smaller than the return reversal of far portfolio following pessimistic periods. This indicates that investors are more reluctant to sell past losing stocks that also recently traded close to the 52-week high following pessimistic periods.

In summary, when investor sentiment is not considered, investors pay more attention to past returns and are reluctant to act upon information regarding the 52-week high position. However, the returns of the 52-week high (near minus far) strategy, within the winner portfolio of stocks would generate significantly positive returns. When optimistic and pessimistic investor sentiment is considered, the results change. During an optimistic period, the near minus far portfolio will generate highly positive returns attributed to the high return continuations of the near portfolio with winner stocks and strong return continuations of the far portfolio within loser stocks. So, following optimistic periods, investors pay significant attention to the 52-week high position along with whether the stock is winning or losing. In pessimistic periods however, investors do not pay attention or are reluctant to act upon 52-week high information. More importantly, the pessimistic investor sentiment enhances winner

portfolio continuations and loser portfolio reversals, but there are only small differences in returns between the near and far portfolio, and especially at longer holding periods. In conclusion, investors are reluctant to act upon information about stock price relative to the 52-week high except during optimistic period. These findings are in line with the findings of Hao et al. (2018) that the 52-week high is a better predictor for future returns; however, these results show that this is true only in optimistic periods.

4.6.1.2.2 52-week high over momentum

For the second analysis, in each given month stocks are ranked based on their nearness of the 52-week high.[49] Table 4.6 shows the results for the four different categories. First, the strategy is implemented without controlling for investor sentiment. This is sorted for nearness of the 52-week high to create the near and far portfolio. After that, stocks are sorted within the near and far portfolio into winners and loser stocks. Results show that implementing a momentum strategy within the near portfolio would yield positive returns in all the different holding periods but these returns decrease as the holding period is increased. As regards winners within the near portfolio, there are positive returns that decrease with the holding period. For losers within the near portfolio, positive returns are also observable, but they increase with the holding period. If investors anchor on the stocks' proximity to their 52-week high, a further partition into winners and losers will produce positive and high momentum (winner minus loser) returns, especially for the shorter holding periods. Near stocks are stocks that trade close to their 52-week high or have recently received some good news. If investors anchor on the stocks' proximity to the 52-week high, then it is expected to see slow adjustment of prices to further good news and strong return continuations (anchoring effect).[50] Winner stocks within the near portfolio produce higher (positive) return continuations than the loser stocks within the same portfolio. This indicates that investors who anchored on recently received good news (close to 52-week high) will be more reluctant to buy stocks that have also experienced capital gains (winners) compared to capital losses (losers) over the past 12-months, especially when further good news arrives. Further, the disposition effect is weaker for losers compared to winners within the near portfolio as investors are less reluctant to buy stocks that, despite their long

[49] Stocks in top 30% will be assigned to the 'near' portfolio and stocks in the bottom 30% will be assigned to the 'far' portfolio. Within the near and far portfolios implementing the momentum strategy by ranking stocks based on their past 12 month returns. Stocks with top 30% higher returns will be assigned to the winner portfolio and stocks that are in the bottom 30% will be assigned to the loser portfolio. Buying the winner portfolio and hold it for 3, 6, 9 and 12 months and sell short the loser portfolio and hold it for 3, 6, 9 and 12 months.

[50] Investors are increasingly reluctant to buy stocks that trade close to their 52-week high and they are doubtful that further good news is likely to create a new reference point or new 52-week high.

history of low (positive or negative) returns, the market is currently pricing close to their 52-week high. So, investors who primarily act on the proximity of stocks to the 52-week high, will make a positive momentum return if they further sort these stocks into past winners and losers.

Table 4.6
52-week high over momentum

In this analysis it first sort by nearness of the 52-week high by dividing the market into three groups: top 30% (near), neutral, and bottom 30% (far). Within the near and far portfolio, it sorts by the past returns. Analysis reports the winner and loser portfolios returns within the near and far portfolios. The winner and loser portfolio represent top 30% and bottom 30% of past returns. Analysis period from 1965 to 2018.

Portfolio	***K***	3	6	9	12
	52-week				
Near	L	0.0087	0.0095	0.0099	0.01
	W	0.0151	0.0143	0.0135	0.0126
	W-L	0.64%	0.48%	0.36%	0.25%
	Ann	7.97%	5.90%	4.43%	3.10%
Far	L	0.0069	0.0067	0.0075	0.0086
	W	0.0084	0.0077	0.0073	0.0073
	W-L	0.16%	0.10%	-0.02%	-0.13%
	Ann	1.91%	1.20%	-0.21%	-1.52%

For the far portfolio, similar return behaviour is observed to the near one for the winner and loser stocks. The winner stocks within the far portfolio yield positive returns that decrease with the holding period, while the loser stocks within the same portfolio yield positive returns that increase with the holding period. For that reason, the difference between the winner and loser returns decrease as the strategy is held for longer. For example, the 3-month holding period gives an average monthly momentum return of 0.16% (1.91% annual), while the 12-month holding period gives an average monthly momentum return of -0.13% (-1.52%). Far stocks are stocks that trade far from their 52-week. If investors anchor on the stocks' proximity to the 52-week high, then slow adjustment of prices to further bad news and strong return continuations (anchoring effect) may be expected.[51] Winner stocks within the far portfolio produce slightly higher (lower) positive returns than the loser stocks, within the same portfolio, for holding periods of 3 (9) and 6 (12) months. This result shows that investors who anchor on stocks that recently traded far from their 52-week high will be more reluctant to sell stocks that have also experienced capital losses (losers) compared to capital gains (winners) over the past 12-months, especially when further bad news arrive. Further, the disposition effect is weaker for

[51] Investors are increasingly reluctant to sell stocks that trade far from their 52-week high (or close to the 52-week low) and they are doubtful that further bad news will move prices further down or is likely to create a new reference point (for example a new 52-week low).

winners compared to losers within the far portfolio, as investors are less reluctant to sell stocks which, despite their long history of high (positive) returns, the market is currently pricing them far from their 52-week high. As a result, winners within the far portfolio are more likely to experience increased selling pressure which leads to high undervalued stocks and more pronounced reversals. So, investors who primarily act on the proximity of stocks to the 52-week high, will make only a small positive momentum return if they further sort these stocks into past winners and losers.

The double sorting strategy is now applied, sorting first by closeness to 52-week high and then by past returns whilst controlling for investor sentiment. First, the near portfolio is discussed in both optimistic and pessimistic periods. The results for the near portfolio returns are shown in table 4.7. In an optimistic period, implementing a momentum (winner minus loser) strategy within the near portfolio yields low positive returns in shorter holding periods. However, as the strategy is held for longer than 6 months, the returns turn low negative. This happens due to loser portfolio returns increasing over time, while the winner portfolio returns are relative stable over time. More, the winner and loser stocks within the near portfolio produce positive returns that are close the overall near portfolio returns in optimistic periods.

Table 4.7

52-week high over momentum (near portfolio)

This analysis examines the near portfolio sorted by 52-week high. It then divides the market into three deciles: top 30% and bottom 30%. Within the near portfolio, it sorts by the past returns (12 months). It reports the winner and loser portfolios returns within the near portfolio. The winner and loser portfolios represent top 30% and bottom 30%. Investor sentiment rolling average developed by Antoniou et al. (2013) is used. Weights are assigned for each month on the past three months to measure current month's sentiment. This is run for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
	52-week				
Optimistic	L	0.0085	0.01	0.0117	0.0118
	W	0.0105	0.0113	0.0109	0.01
	W-L	0.20%	0.13%	-0.08%	-0.18%
	Ann	2.38%	1.61%	-0.99%	-2.19%
Pessimistic	L	0.0108	0.0122	0.0113	0.0119
	W	0.0205	0.021	0.0188	0.0185
	W-L	0.97%	0.88%	0.75%	0.66%
	Ann	12.27%	11.04%	9.37%	8.20%

Near stocks are stocks that trade close to their 52-week high or have recently received some good news. If investors anchor on the stocks' proximity to the 52-week high then expect to see slow adjustment of prices to further good news and strong return continuations (anchoring

effect). Winner stocks within the near portfolio produce slightly higher (positive) return continuations than the loser stocks within the same portfolio. This indicates that following optimistic periods, investors who anchored on recently received good news (close to 52-week high) will only be slightly more reluctant to buy stocks that have also experienced capital gains (winners) compared to capital losses (losers) over the past 12-months, especially when further good news arrive. Although the disposition effect is weaker for losers compared to winners within the near portfolio and for the overall period, following optimistic periods investors are less reluctant to buy stocks that, despite their long history of positive or negative returns, the market is currently pricing close to their 52-week high. So, following optimistic periods, investors who primarily focus on the stocks' position relative to their 52-week high will make only a small positive (or negative) momentum return if they further sort these stocks into past winners and losers.

Following a pessimistic period, implementing a momentum (winner minus loser) strategy on stocks that are near their 52-week high yields highly positive returns. In fact, the momentum strategy yields return four times (or more) higher in a pessimistic period than in an optimistic one. These higher returns could be attributed to the significantly high positive returns of the winner portfolio. Even though the loser portfolio yields positive returns, the magnitude of the winners returns dominates it, resulting in highly positive momentum returns. The highest momentum return is observed for the 3-month holding period at 0.97% average monthly return (12.27% annually) and the lowest one for the 12-month holding period at 0.66% average monthly return (8.20% annually). Analysing both the winner and loser portfolio returns within the near portfolio and during pessimistic period gives us a better understanding of investor behaviour. The loser stocks within the near portfolio yield positive returns that slightly increase with the holding period, while the winner stocks produce positive returns that slight decrease with the holding period. Winner stocks within the near portfolio produce significantly higher (positive) return continuations than the loser stocks within the same portfolio. This indicates that following pessimistic periods, investors who anchored on stocks that recently received good news or trade close to their 52-week high will be extremely more reluctant to buy stocks that have also experienced capital gains (winners) compared to capital losses (losers) over the past 12-months, especially when further good news arrive. In particular, stocks that trade close to their 52-week high and have experienced highly positive returns in the past is like having recently and in the past received good news, while further good news on the same stocks will be in contrast with investors' pessimistic sentiment. The cognitive dissonance effect combined

with anchoring and the stronger disposition effect of winners compared to losers within the near portfolio explain the strong return continuations of the winning stocks during pessimistic periods. In other words, following pessimistic periods investors are increasingly reluctant to buy stocks that, despite their long history of large positive returns, the market is currently pricing close to their 52-week high. So, following a pessimistic investor sentiment, investors who primarily focus on the stocks' position relative to their 52-week high will make a large positive momentum return if they further sort these stocks into past winners and losers.

Further, analyses are conducted on the behaviour of winner and loser stocks within the far (from the 52-week high) portfolio in both optimistic and pessimistic periods to examine the effect of investor sentiment.[52] The optimistic period is looked at first. As the results show in table 4.8, applying a momentum strategy on stocks that are far from their 52-week high, following an optimistic period, yields high (low) positive returns for the 3 (9) and 6 (12) month holding periods. For example, the 3-month holding period momentum returns are 0.8% average monthly (9.98% annually) but this decreases to 0.1% average monthly (1.15% annually) for 12-month holding periods. The high positive momentum returns are driven by the high return continuation of losers (which is shorted) compared to winners. Moreover, loser stocks within the far portfolio produce high negative returns that become smaller at longer holding periods. The winners within the same portfolio also give negative returns that become less negative over the holding period. Loser stocks within the far portfolio produce significantly higher (negative) return continuations than the winner stocks within the same portfolio. This shows that, following optimistic periods, investors who anchored on stocks that recently received bad news or trade far from their 52-week high will be more reluctant to sell stocks that have also experienced capital losses (losers) compared to capital winners (losers) over the past 12-months, especially when further bad news arrives. In particular, stocks that trade far from their 52-week high and have experienced highly negative returns in the past is like having recently and in the past received bad news, while further bad news on the same stocks will be in contrast with investors' pessimistic sentiment (cognitive dissonance). The cognitive dissonance effect

[52] Recall here the behaviour of winners and losers within the far (from the 52-week high) portfolio. Implementing a momentum strategy on stocks that are far from their 52-week high would yield negative returns in longer holding periods and positive returns in shorter periods. This is because the loser portfolio returns increase as the holding period increases and the winner portfolio returns decreases as holding them for longer. Thus, the momentum returns start small positive but become small negative as holding the strategy for longer periods. This result indicates that investors who have anchored on stocks being far from their 52-week high are not overly concerned about whether the same stocks have been past winners or losers.

combined with anchoring and the stronger disposition effect of losers compared to winners within the far portfolio explains the strong return continuations of the losing stocks during optimistic periods. In other words, following optimistic periods, investors are increasingly reluctant to sell stocks that, despite their long history of large negative returns, the market is currently pricing far from their 52-week high. So, following an optimistic investor sentiment, investors who primarily focus on the stocks' position relative to their 52-week high will make a large positive momentum return if they further sort these stocks into past winners and losers and hold the portfolio up to 6 months.

Table 4.8
52-week high over momentum (far portfolio)

In this analysis it looks at the far portfolio sorted by 52-week high. It then divides the market into three groups: top 30%, neutral, and bottom 30%. Within the far portfolio, it sorts by the past returns (12 months). It reports the winner and loser portfolios returns within the far portfolio. The winner and loser portfolio represent top 30% and bottom 30%. Investor sentiment rolling average developed by Antoniou et al. (2013) is used. It assigns weights for each month on the past three months to measure current month's sentiment. It run this for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
	52-week				
Optimistic	L	-0.0106	-0.0085	-0.0034	-0.0022
	W	-0.0026	-0.0024	-0.0012	-0.0013
	W-L	0.80%	0.61%	0.22%	0.10%
	Ann	9.98%	7.61%	2.64%	1.15%
Pessimistic	L	0.0233	0.0236	0.0183	0.0158
	W	0.0196	0.0195	0.0161	0.0146
	W-L	-0.37%	-0.41%	-0.22%	-0.12%
	Ann	-4.38%	-4.77%	-2.64%	-1.49%

Implementing a momentum (winner minus loser) strategy during a pessimistic period for stocks that are far from their 52-week high yields negative returns that become also smaller at longer holding periods. Holding the momentum portfolio for 3 months yields average monthly momentum returns of -0.37% (-4.38% annually), while holding the same portfolio for 12 months yields average monthly returns of -0.12% (-1.49% annually). Both winners and losers within the far portfolio exhibit big return reversals that decrease with the holding period following pessimistic periods. However, the loser portfolio return reversals are bigger than winner portfolio ones. Far stocks are stocks that trade far from their 52-week high. If investors anchor on the stocks' distance from the 52-week high then expect to see slow adjustment of prices to further bad news and strong return continuations (anchoring effect). However, loser stocks within the far portfolio produce higher return reversals than the winner stocks within the same portfolio. This result show that following pessimistic periods, investors who anchored

on stocks that recently traded far from their 52-week high will be less reluctant to sell stocks that have also experienced capital losses (losers) compared to capital gains (winners) over the past 12-months, especially when further good news arrives. Although the disposition effect is weaker for winners compared to losers within the far portfolio and for the overall period, following pessimistic periods investors are less reluctant to sell stocks that, despite their long history of negative returns, the market is currently pricing far from their 52-week high.[53] In other words, the pessimistic investor sentiment agrees with the past and recently received bad news, thus making investors less reluctant to sell past losers thinking that further bad news would have lasting rather transitory effect on prices.[54] So, following pessimistic periods, investors who primarily focus on the stocks' position relative to their 52-week high will make a negative momentum return if they further sort these stocks into past winners and losers.

In summary, employing a momentum strategy having already controlled for 52-week high reference point yields significantly higher and positive returns for the near portfolio compared to the far portfolio. For stocks that are near their 52-week high, momentum is always positive, but for stocks that are far from their 52-week high, momentum returns turn negative as stocks are held for longer periods. However, in an optimistic period, momentum returns are significantly higher and positive for the far portfolio compared to the near one. This result is attributed to the strong return continuation of losers within the far portfolio and the pronounced cognitive dissonance effect (bad news contradicts the positive investor sentiment). More, in a pessimistic period, stocks that are near their 52-week high show positive momentum returns, while stocks that are far from their 52-week high produce negative momentum returns. This result is attributed to the strong return continuation of winners within the near portfolio and the pronounced cognitive dissonance effect (good news contradicts the pessimistic investor sentiment). Overall, this result show that investors who primarily focus on the stocks' position relative to their 52-week high, will make a positive momentum return due to winners in

[53] The far portfolio during pessimistic periods generates highly positive reversing returns that decrease slightly at longer holding periods. It seems that investors exercise strong selling pressure when far portfolio stocks receive further bad news especially during a pessimistic market state. When news is in sync with the current sentiment, investors act upon it in a timely manner and information diffuses quickly. Often, they will even push prices away from its long-run values to a point that the reversal is imminent. The far portfolio during pessimistic periods also experiences a strong disposition effect (due to anchoring) but it is not strong enough to prevent investors from selling the stock in the same direction with the news or the market's pessimistic sentiment. As a result, seeing that the far portfolio reversing during pessimistic period.

[54] In this case, losers with the far portfolio will experience high selling pressure which leads to increasingly undervalued stocks. This will make reversals more pronounced for losers compared to winners for the shorter holding periods.

pessimistic periods and losers in optimistic periods. Based on the results, the cognitive dissonance effect shows stronger effect when stocks are ranked based on their position form the 52-week high. This result is consistent and provide further support to the cognitive dissonance effect of Antoniou et al. (2013).

4.6.2 Robustness check

4.6.2.1 Fama–Macbeth regression

As a further check on the profitability of the different momentum strategies, Fama–Macbeth regression on 52-week high strategy and the JT strategy is conducted. The Fama–MacBeth cross-sectional regressions (1973) will enable us to compare the two strategies simultaneously and control for the effects of firm size and bid-ask bounce. The dependent variable in these regressions is the $\text{month} - t$ return to stock i, Ri, t. The explanatory variables are dummies that indicate whether stock i is held in month t as part of the JT or the 52-week high strategy. The coefficients on the dummies allow us to examine the return to a single strategy in isolation from the other strategy. Table 4.9 reports the regression results. The coefficients on the 52-week high momentum dummies dominate those on the JT momentum strategy across all holding periods but the 3-month one. For example, holding a self-financing 52-week high momentum portfolio for 6-months yields 0.429% per month, which is much greater than 0.296% per month earned by JT momentum portfolio. Interestingly, the coefficients on past winners are positive and significant only for the 3- and 6-month holding periods, while the coefficient on the near the 52-week high stocks are positive and significant for the 9 and 12 holding periods. Most importantly, stocks that are far from the 52-week high yield negative and significant returns across all holding periods indicating that stocks that trade far from their 52-week are due for more negative news regardless of whether the same stocks have experienced gains (winners) or losses (losers) in the past. Returns for the winner portfolio of the JT strategy decrease as the holding period increases, which is consistent with this previous result. Returns for the loser portfolio also decrease as the holding period is extended. The 52-week high portfolios show a different trend. The near portfolio shows a slight increase as the holding period is extended and the far portfolio shows decreasing returns over the holding periods. Moreover, looking at the control variables, the size effect is negative and significant across the different holding periods, which indicates that stocks with large market cap yield lower returns. Similarly, the negative and significant coefficients on past returns confirm the bid-ask bounce effect.

The results above could be affected by exposure to risk factors, i.e. market, size, and/or value. Therefore, the cross-sectional regression is run again on risk-adjusted returns. These returns were first used with a Fama and French three-factor model and then regressed again cross-sectionally. The results reported in Table 4.10 show that the dominance of the 52-week high strategy is stronger in risk-adjusted returns than in raw returns. This finding does not rely on excessive risk taken, or on the market, size, or value factors. Finally, the same regression while skipping a month between the observation period and the holding period. Table 4.A9 in the appendix presents the results. It shows that even when skipping a month, similar results are present. In fact, the results are very close, which in turn indicate that the results of the Fama–Macbeth regression show the original results to be robust.

Table 4.9

Profitability of momentum strategy (Fama–Macbeth regression)

In each month t from January 1965 to December 2018, the following 3, 6, 9 or 12 cross-sectional regressions are performed (for $j = 1$ to $j = 3, 6, 9,$ or 12): $ri,t = b0jt + b1jt\ ri,t-1 + b2jt\ SIZEi,t-1 + b3jt\ JTHi,t-j + b4jt\ JTLi,t-j + b5jt\ 52WHHi,t-j + b6jt\ 52WHLi,t-j + \varepsilon i,t,$ where $r_{i,t}$ is the return of stock i in month t; $SIZE_{i,t-1}$ is the natural logarithm of stock i's market capitalization at the end of previous month; and $JTW_{i,t-j}$ ($JTL_{i,t-j}$) is a dummy variable that equals 1 if stock i's JT measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise; $52WHN_{i,t-j}$ ($52WHF_{i,t-j}$) is a dummy variable that equals 1 if stock i's 52WH measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise. In each month t, it estimates 3 or 6 or 9 or 12 cross-sectional regressions (for $j = 1$ to $j = 3, 6, 9,$ or 12): and average the corresponding coefficient estimates. Numbers in the parentheses are the P-values calculated using Newey and West's (1987) robust standard errors. In panel A month is not skipped between the observation period and the formation period. In Panel B a month is skipped between observation period and formation period.

Panel A

Variable	Raw return (1,3)	Raw return (1,6)	Raw return (1,9)	Raw return (1,12)
Intercept	3.0300	3.0100	2.9300	2.8600
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$R_{i,t-1}$	-5.1500	-5.1800	-5.1800	-5.1800
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	-0.1660	-0.1620	-0.1550	-0.1480
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0001)
JTW	0.2780	0.1840)	0.1060	0.0504
P-value	(0.0022)	(0.0356)	(0.2075)	(0.5232)
JTL	-0.1940	-0.1110	-0.0479	-0.0091
P-value	(0.0110)	(0.1273)	(0.4751)	0.8871
52WHN	0.1120	0.1280	0.1400	0.1200
P-value	(0.0969)	(0.0507)	(0.0283)	0.0537
52WHF	-0.3160	-0.3010	-0.2640	-0.2010
P-value	(0.0026)	(0.0031)	(0.0073)	0.0383
JTW-JTL	0.4710	0.2960	0.1540	0.0595
P-value	(0.0004)	(0.0197)	(0.1866)	0.5757
52WHN-52WHF	0.4290	0.4290	0.4030	0.3210

P-value	(0.0072)	(0.0053)	(0.0064)	0.0276

Panel B

Variable	Raw Return (2,4)	Raw Return (2,7)	Raw Return (2,10)	Raw Return (2,13)
Intercept	0.0302	0.0300	0.0292	0.0283
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$R_{i,t-1}$	-0.0517	-0.0519	-0.0519	-0.0518
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	-0.0017	-0.0016	-0.0015	-0.0015
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0002)
JTW	0.0024	0.0015	0.0007	0.0002
P-value	(0.0085)	(0.0893)	(0.3779)	(0.7825)
JTL	-0.0013	-0.0007	-0.0002	0.0002
P-value	(0.0754)	(0.3200)	(0.8122)	(0.7766)
52WHN	0.0013	0.0014	0.0015	0.0012
P-value	(0.0574)	(0.0355)	(0.0208)	(0.0459)
52WHF	-0.0036	-0.0032	-0.0027	-0.0020
P-value	(0.0006)	(0.0018)	(0.0062)	(0.0400)
JTW-JTL	0.0037	0.0022	0.0009	0.0000
P-value	(0.0049)	(0.0793)	(0.4376)	(0.9731)
52WHN-52WHF	0.0049	0.0045	0.0041	0.0032
P-value	(0.0023)	(0.0031)	(0.0049)	(0.0264)

Table 4.10

Profitability of momentum strategy: cross-sectional regression

The risk-adjusted returns *b* are obtained by conducting a time series regression of coefficient averages on Fama and French risk factors to subtract the effect of these factors form the returns. In panel A month is not skipped between the observation period and the formation period. In Panel B a month is skipped between observation period and formation period.

Panel A

Variable	FF adj. (1,3)	FF adj. (1,6)	FF adj. (1,9)	FF adj. (1,12)
Intercept	0.0235	0.0235	0.0220	0.0206
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$\boldsymbol{Ri, t-1}$	-0.0448	-0.0445	-0.0446	-0.0448
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	-0.0016	-0.0016	-0.0015	-0.0014
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
JTW	0.0025	0.0015	0.0007	0.0001
P-value	(0.0010)	(0.0347)	(0.2650)	(0.8685)
JTL	-0.0029	-0.0022	-0.0016	-0.0011
P-value	(0.0000)	(0.0009)	(0.0089)	(0.0561)
52WHN	0.0024	0.0026	0.0028	0.0025
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)

52WHF	-0.0042	-0.0041	-0.0037	-0.0031
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0001)
JTW-JTL	0.0055	0.0038	0.0023	0.0012
P-value	(0.0000)	(0.0016)	(0.0259)	(0.1846)
52WHN-52WHF	0.0066	0.0067	0.0065	0.0056
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Panel B

Variable	FF Adj. (2,4)	FF Adj. (2,7)	FF Adj. (2,10)	FF Adj. (2,13)
Intercept	0.0232	0.0225	0.0216	0.0097
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0182)
$R_{i,t-1}$	-0.0448	-0.0450	-0.0453	-0.0389
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	-0.0016	-0.0015	-0.0015	-0.0005
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0958)
JTW	0.0022	0.0013	0.0005	0.0001
P-value	(0.0032)	(0.0690)	(0.4028)	(0.8739)
JTL	-0.0023	-0.0018	-0.0013	-0.0020
P-value	(0.0009)	(0.0054)	(0.0285)	(0.0003)
52WHN	0.0025	0.0026	0.0028	0.0027
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
52WHF	-0.0046	-0.0042	-0.0037	-0.0046
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
JTW-JTL	0.0045	0.0031	0.0018	0.0021
P-value	(0.0003)	(0.0074)	(0.0700)	(0.0221)
52WHN-52WHF	0.0071	0.0068	0.0065	0.0072
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)

4.6.2.2 Fama–Macbeth regression on investor sentiment

To establish the robustness of the results during different sentiment periods, the monthly coefficients from the previous Fama–Macbeth regression in table 4.8 will be regressed on the different sentiment periods. The results are presented in table 4.11, while the results with a skipped month between observation and holding period are reported in table 4.A10. Results show that the 52-week high strategy yields higher returns than the momentum strategy in optimistic sentiment periods and across all the different holding periods (and whether a month is skipped between observation and holding periods).

Table 4.11
Cross-sectional regressions conditional on different sentiment states

In each month t from Jan 1965 to December 2018, it perform the following 3, 6, 9 or 12 cross-sectional regressions (for $j = 1$ to $j = 3, 6, 9,$ or 12): $ri,t = b0jt + b1jt\ ri,t-1 + b2jt\ SIZEi,t-1 + b3jt\ JTWi,t-j + b4jt\ JTLi,t-j + b5jt\ 52WHNi,t-j + b6jt\ 52WHFi,t-j + \varepsilon i,t$, where $r_{i,t}$ is the return of stock i in month t; $SIZE_{i,t-1}$ is the natural logarithm of stock i's market capitalization at the end of previous month; and $JTW_{i,t-j}$ ($JTL_{i,t-j}$) is a dummy variable that equals 1 if stock i's JT measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise; $52WHN_{i,t-j}$ ($52WHF_{i,t-j}$) is a dummy variable that equals 1 if stock i's 52WH measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise. In each month t, it estimates 9 or 12 cross-sectional regressions (for $j = 1$ to $j = 10$, or $j = 4$ to $j = 13$) and average the corresponding coefficient estimates.

Numbers in the parentheses are the P-values calculated using Newey and West (1987). In panel A, a month is not skipped between the observation period and the formation period. In panel B a month is skipped between observation and formation period. Once the time series of the average coefficients is obtained from the George–Hwang style regressions, these coefficients are regressed on high, mild, and low sentiment dummies with no intercept to test whether momentum profits in each sentiment state are equal to zero. To test whether the average returns of the momentum strategies in high-sentiment periods are significantly different from that in low-sentiment periods, the time series of average monthly momentum profits on high and mild sentiment dummies with a constant are regressed. Numbers in the parentheses are the P-values.

Panel A

Variable	Raw Return (2,4)				Raw Return (2,7)			
	High	Mild	Low	H-L	High	Mild	Low	H-L
JTW	0.0007	0.0037	0.0019	-0.0012	0.0000	0.0022	0.0012	-0.0011
P-value	(0.6574)	(0.0250)	(0.2203)	(0.5749)	(0.9789)	(0.1189)	(0.4528)	(0.6185)
JTL	-0.0042	-0.0014	0.0016	-0.0058	-0.0032	-0.0006	0.0013	-0.0045
P-value	(0.0020)	(0.1690)	(0.3431)	(0.0082)	(0.0437)	(0.5308)	(0.3545)	(0.0342)
52WHN	0.0046	0.0011	-0.0019	0.0064	0.0049	0.0011	-0.0013	0.0062
P-value	(0.0008)	(0.2360)	(0.1924)	(0.0012)	(0.0005)	(0.1935)	(0.3277)	(0.0016)
52WHF	-0.0087	-0.0021	-0.0004	-0.0083	-0.0070	-0.0022	-0.0012	-0.0059
P-value	(0.0001)	(0.1949)	(0.8305)	(0.0035)	(0.0007)	(0.1267)	(0.5104)	(0.0317)
JTW-JTL	0.0048	0.0051	0.0002	0.0046	0.0033	0.0027	-0.0001	0.0034
P-value	(0.0323)	(0.0152)	(0.9335)	(0.2001)	(0.2234)	(0.1225)	(0.9538)	(0.3457)
52WHN-52WHF	0.0132	0.0032	-0.0015	0.0147	0.0119	0.0034	-0.0002	0.0121
P-value	(0.0000)	(0.1710)	(0.6305)	(0.0010)	(0.0002)	(0.1112)	(0.9560)	(0.0055)

Panel B

Variable	Raw Return (2,10)				Raw Return (2,13)			
	High	Mild	LOW	H-L	High	Mild	LOW	H-L
JTW	0.0005	0.0007	0.0008	-0.0003	0.0004	-0.0002	0.0009	-0.0005
P-value	(0.7131)	(0.6139)	(0.5898)	(0.8689)	(0.7457)	(0.8434)	(0.6085)	(0.8275)
JTL	-0.0024	0.0004	0.0001	-0.0025	-0.0026	0.0009	0.0001	-0.0027
P-value	(0.1430)	(0.6605)	(0.8865)	(0.1707)	(0.0898)	(0.3195)	(0.8526)	(0.1032)
52WHN	0.0040	0.0014	-0.0004	0.0044	0.0033	0.0013	-0.0006	0.0039
P-value	(0.0051)	(0.0909)	(0.7482)	(0.0185)	(0.0446)	(0.0998)	(0.6381)	(0.0557)
52WHF	-0.0041	-0.0021	-0.0027	-0.0014	-0.0035	-0.0015	-0.0020	-0.0015
P-value	(0.0351)	(0.1850)	(0.0897)	(0.5714)	(0.0721)	(0.2825)	(0.1989)	(0.5563)
JTW-JTL	0.0029	0.0002	0.0007	0.0022	0.0030	-0.0012	0.0008	0.0022
P-value	(0.2162)	(0.8865)	(0.7229)	(0.4802)	(0.1677)	(0.4460)	(0.7124)	(0.4690)
52WHN-52WHF	0.0081	0.0036	0.0023	0.0058	0.0069	0.0029	0.0015	0.0054
P-value	(0.0061)	(0.1156)	(0.3953)	(0.1440)	(0.0346)	(0.1692)	(0.5764)	(0.2011)

The difference between the returns of the 52-week high strategy in optimistic minus pessimistic sentiment periods significantly exceeds the difference between momentum returns in the same sentiment periods. The majority of the results are statistically significant for the 52-week high but not significant for the momentum returns. These results are in sync with what been reported in Hao et al. (2018).

4.6.2.3 Risk of bid and ask spread

Taking into consideration the risk of spreads when forming a portfolio, the same analysis was conducted on all strategies by skipping one month. This robustness check will not only enhance the results but also eliminate any risks associated with portfolio creation. Table 4.1 shows the JT momentum returns for the overall market. As discussed in the analysis section, the market exhibits differing levels of momentum across the different holding periods. While skipping a month changes the returns figures, it does not change the overall results (see table 4.12). This indicates that the results for the momentum strategy are fairly robust.

Table 4.12
Market momentum

Cross sectional momentum is formed based on observation period *J* months and holding period *K* months. *J* and *K* represent the different holding and observation period strategies. Stocks are ranked based on their past performance over *J* months in ascending order. 3 equally weighted portfolios are formed based on the past *J* months performance. P1 is the loser portfolio and P3 is the winning portfolio. Stocks with the most returns over the observation period *J* months (P3) are bought and stocks with the lowest performance over J months is sold (P1). One month is skipped between the observation and holding period. The average monthly returns are presented in this table. The sample period is January 1965 to December 2018. Optimistic and pessimistic periods are formed following Antoniou et al. (2013).

Portfolio	***K***	3	6	9	12
Market	L	0.0067	0.0079	0.0087	0.0095
	W	0.0124	0.0118	0.0112	0.0106
	W-L	0.57%	0.39%	0.24%	0.11%
	Ann	7.03%	4.84%	2.94%	1.29%
Optimistic	L	-0.0046	-0.0015	0.0018	0.0041
	W	0.0083	0.0086	0.0104	0.0112
	W-L	1.29%	1.01%	0.86%	0.71%
	Ann	16.57%	12.82%	10.85%	8.84%
Pessimistic	L	0.0212	0.0177	0.0141	0.0149
	W	0.0193	0.0178	0.0165	0.0168
	W-L	-0.19%	0.01%	0.24%	0.19%
	Ann	-2.23%	0.13%	2.90%	2.30%

The same analysis was conducted for the 52-week strategy of the overall market (see table 4.A2). As in table 4.2, the results show that skipping a month after the observation period will only change the return figures slightly. The overall results for the 52-week high strategy are

very similar despite skipping a month after the observation period. The results show that even in optimistic or pessimistic periods, skipping one month does not change the results. This indicates more robustness and confirmation for this previous analysis. The same set of analysis were also performed for the double sort strategies. The results for both of these strategies did not change after skipping a month, which indicates that this initial result is robust. In the appendix section all of the tables that skip a month for all the different strategies considered are shown.

4.6.2.4 Persistence of momentum profits

Following the methodology of George and Hwang (2004) and Hao et al. (2018), a persistence analysis was conducted to measure how momentum and 52-week high perform in the future and whether a continuation or a reversal is observed beyond year one. Table 4.13 reports the persistence results. The analysis is similar to that in table 9; however, that time gap between when past performance is measured and when the stocks are held ranges from one to four years. For example, raw return (14,25) means that return performance over the past 12 months is observed, skip a month between observation and holding period, while the portfolio's performance that reported is from month 14 to month 25 (essentially the return over the second year). In the table below (4.13) are the returns of the different strategies for the second to the fifth year after portfolio formation. Similar to the results in Hao et al. (2018) and George and Hwang (2004), the momentum strategy shows a reversal in the second to the fifth year. However, only the second and the fifth year show significant return reversals. In particular, there is evidence of significant reversals for winners in year two and for losers in year five. Although, the 52-week high strategy yields negatives returns for all single years from year to 2 to year 5, none of the reversals are statistically significant. More, there is no evidence of significant reversals for either near to or far from 52-week high stocks.

A persistence analysis of momentum and 52-week high profits during different sentiment periods is also conducted. Table 4.14 show the results. Contrary to the findings of Hao et al. (2018) and Antoniou et al. (2013) in which they find that momentum profits exhibit reversal in high sentiment periods, these results show that momentum exhibits reversal during low sentiment or pessimistic periods only. Differences in time period may explain some of the difference, as Hao et al. (2018) and Antoniou et al. (2013) run from 1965 to 2010, whereas the time period in this case extends to the end of 2018. The momentum coefficients reverse in all different sentiment periods but the reversal is only significant in low sentiment periods and for

years two and five only. For the 52-week high strategy, reversal only occurs in pessimistic sentiment periods, but with no statistical significance. The only significance in the 52-week high strategy is observed when the difference between the high and low sentiment periods is taken, which shows continuation of the 52-week high returns up to 5 years.

Table 4.13

Persistence of momentum profits

In each month t from Jan 1965 to December 2018, it perform the following 12 cross-sectional regressions (for $j = 14$ to $j = 25$ or $j = 50$ to $j = 61$): $r_{i,t} = b_{0jt} + b_{1jt}\, r_{i,t-1} + b_{2jt}\, SIZE_{i,t-1} + b_{3jt}\, JTW_{i,t-j} + b_{4jt}\, JTL_{i,t-j} + b_{5jt}\, 52WHH_{i,t-j} + \mathrm{b_{6jt}}\, 52\mathrm{WHL_{i,t-j}} + \varepsilon_{i,t}$ where $r_{i,t}$ is the return of stock i in month t; $SIZE_{i,t-1}$ is the natural logarithm of stock i's market capitalization at the end of previous month; $JTW_{i,t-j}$ ($JTL_{i,t-j}$) is a dummy variable that equals 1 if stock i's JT measure is ranked at the top (bottom) 30% at the end of month $t - j$, and zero otherwise and $52WHH_{i,t-j}$ ($52WHL_{i,t-j}$) is a dummy variable that equals 1 if stock i's 52WH measure is ranked at the top (bottom) 30% at the end of month $t - j$, and zero otherwise. In each month t, 12 cross-sectional regressions are estimated for $j = 14$ to $j = 25$ or $j = 50$ to $j = 61$ and average the corresponding coefficient estimates. Also included results without January.

Variable	Raw return (14,25)		Raw return (26,37)		Raw return (38,49)		Raw return (50,61)	
	Jan inc.	Jan exc.	Jan inc.	Jan exc.	Jan inc.	Jan exc.	Jan inc.	Jan exc.
Intercept	0.0256	0.0095	0.0261	0.0093	0.0261	0.0088	0.0261	0.0091
P-value	(0.0001)	(0.1343)	(0.0000)	(0.1298)	(0.0000)	(0.1525)	(0.0000)	(0.1391)
$\mathbf{R_{i,t-1}}$	-0.0514	-0.0420	-0.0516	-0.0421	-0.0523	-0.0428	-0.0514	-0.0417
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	-0.0012	0.0000	-0.0012	0.0000	-0.0012	0.0000	-0.0012	0.0001
P-value	(0.0041)	(0.9351)	(0.0022)	(0.9423)	(0.0024)	(0.9554)	(0.0028)	(0.8730)
JTW	-0.0014	-0.0014	-0.0004	-0.0006	-0.0004	-0.0007	-0.0011	-0.0016
P-value	(0.0632)	(0.0653)	(0.5623)	(0.4295)	(0.5733)	(0.3186)	(0.1435)	(0.0401)
JTL	0.0009	-0.0002	0.0003	-0.0004	0.0004	0.0001	0.0012	0.0010
P-value	(0.1579)	(0.7239)	(0.6190)	(0.5260)	(0.3892)	(0.8519)	(0.0077)	(0.0309)
52WHN	-0.0002	0.0003	-0.0002	0.0003	0.0000	0.0003	-0.0005	-0.0003
P-value	(0.7842)	(0.6137)	(0.7218)	(0.5959)	(0.9900)	(0.5903)	(0.2669)	(0.5098)
52WHF	0.0007	-0.0008	0.0005	-0.0005	0.0000	-0.0009	-0.0004	-0.0011
P-value	(0.4741)	(0.3696)	(0.5382)	(0.5546)	(0.9777)	(0.2473)	(0.5515)	(0.0693)
JTW-JTL	-0.0022	-0.0012	-0.0007	-0.0002	-0.0009	-0.0009	-0.0023	-0.0025
P-value	(0.0259)	(0.2019)	(0.4002)	(0.8356)	(0.3369)	(0.3382)	(0.0060)	(0.0024)
52WHN-52WHF	-0.0008	0.0011	-0.0007	0.0008	0.0000	0.0012	-0.0001	0.0008
P-value	(0.5557)	(0.4229)	(0.5833)	(0.5453)	(0.9811)	(0.3288)	(0.9042)	(0.4069)

Table 4.14

Persistence of momentum profits conditional on different sentiment states

In each month t from July 1965 to December 2010, it perform the following 12 cross-sectional regressions (for $j = 14$ to $j = 25$ or $j = 50$ to $j = 61$): $r_{i,t} = b_{0jt} + b_{1jt}r_{i,t-1} + b_{2jt}SIZE_{i,t-1} + b_{3jt}JTH_{i,t-j} + b_{4jt}JTL_{i,t-j} + b_{5jt}52WHH_{i,t-j} + b_{6jt}52WHL_{i,t-j} + \varepsilon_{i,t}$ where $r_{i,t}$ is the return of stock i in month t; $SIZE_{i,t-1}$ is the natural logarithm of stock i's market capitalization at the end of previous month; $JTH_{i,t-j}$ ($JTL_{i,t-j}$) is a dummy variable that equals 1 if stock i's JT measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise and $52WHH_{i,t-j}$ ($52WHL_{i,t-j}$) is a dummy variable that equals 1 if stock i's 52WH measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise. In each month t, 2 cross-sectional regressions for $j = 14$ to $j = 25$ and $j = 50$ to $j = 61$ are estimate and the corresponding coefficient estimates averaged. Once it has the time series of the average coefficients from the George–Hwang style regressions, these coefficients are regressed on high, mild, and low sentiment dummies with no intercept to test whether momentum profits in each sentiment state are equal to zero. To test whether the average returns of the momentum strategies in high-sentiment periods are significantly different from that in low-sentiment periods, the time series of average monthly momentum profits is regressed on high and mild sentiment dummies with a constant. Numbers in the parentheses are the P-values calculated using Newey and West's (1987) robust standard errors.

Variable	**Raw Return (14,25)**				**Raw Return (26,37)**				**Raw Return (38,49)**				**Raw Return (50,61)**			
	High	**Mild**	**Low**	**H-L**	**High**	**Mild**	**Low**	**H-L**	**High**	**Mild**	**Low**	**H-L**	**High**	**Mild**	**Low**	**H-L**
JTW	-0.0037	-0.0009	-0.0012	-0.0026	-0.0039	0.0003	0.0003	-0.0042	-0.0011	-0.0002	-0.0007	-0.0004	-0.0025	-0.0005	-0.0018	-0.0008
P-value	(0.0539)	(0.2929)	(0.4753)	(0.3065)	(0.0640)	(0.7548)	(0.7927)	(0.0778)	(0.4276)	(0.8759)	(0.5788)	(0.8312)	(0.0561)	(0.6267)	(0.2846)	(0.7144)
JTL	0.0006	0.0003	0.0028	-0.0022	-0.0014	0.0002	0.0018	-0.0032	-0.0012	0.0003	0.0022	-0.0034	-0.0001	0.0012	0.0024	-0.0025
P-value	(0.6419)	(0.6902)	(0.0036)	(0.1669)	(0.2752)	(0.8241)	(0.0283)	(0.0351)	(0.3413)	(0.6473)	(0.0164)	(0.0316)	(0.8970)	(0.0391)	(0.0040)	(0.0700)
52WHN	0.0028	-0.0003	-0.0019	0.0047	0.0008	0.0000	-0.0016	0.0024	0.0011	-0.0002	-0.0003	0.0014	0.0013	-0.0005	-0.0018	0.0031
P-value	(0.0404)	(0.6441)	(0.0126)	(0.0029)	(0.3420)	(0.9986)	(0.1222)	(0.0722)	(0.2878)	(0.7659)	(0.7546)	(0.3095)	(0.1072)	(0.3649)	(0.0114)	(0.0041)
52WHF	-0.0016	0.0013	0.0006	-0.0022	-0.0013	0.0010	0.0004	-0.0018	-0.0011	0.0003	-0.0002	-0.0010	-0.0011	-0.0003	0.0000	-0.0011
P-value	(0.3989)	(0.3496)	(0.6947)	(0.3655)	(0.2858)	(0.4234)	(0.7658)	(0.3584)	(0.3829)	(0.7634)	(0.9106)	(0.6422)	(0.4140)	(0.7282)	(0.9809)	(0.5114)
JTW-JTL	-0.0043	-0.0012	-0.0039	-0.0004	-0.0026	0.0001	-0.0015	-0.0011	0.0001	-0.0005	-0.0029	0.0030	-0.0024	-0.0016	-0.0042	0.0018
P-value	(0.1352)	(0.2664)	(0.0784)	(0.9122)	(0.3818)	(0.9263)	(0.2045)	(0.7394)	(0.9430)	(0.7063)	(0.0365)	(0.2116)	(0.2639)	(0.0819)	(0.0493)	(0.5555)
52WHN-52WHF	0.0045	-0.0016	-0.0025	0.0069	0.0021	-0.0010	-0.0020	0.0042	0.0023	-0.0005	-0.0001	0.0024	0.0025	-0.0002	-0.0018	0.0043
P-value	(0.1428)	(0.4192)	(0.2352)	(0.0604)	(0.2562)	(0.6039)	(0.3571)	(0.1506)	(0.3027)	(0.7495)	(0.9665)	(0.4609)	(0.2328)	(0.8629)	(0.2484)	(0.0991)

4.7 Conclusion

This chapter has investigated the relationship between momentum returns, the 52-week high and investor sentiment. In this way it attempts to tackle the effect of several behavioural biases such as the disposition effect, the anchoring effect and cognitive dissonance effect. The current literature shows that these behavioural biases individually have the power to explain or predict future returns. It contributes to the existing literature of behavioural finance by investigating the interplay between the aforementioned behavioural biases and using a double sort (JT momentum, 52-week high momentum) investment strategy across periods of optimistic and pessimistic investor sentiment. First, a single-sort strategy based on past return performance or on the stock's proximity to the 52-week high was used. Second, a double-sort strategy where stocks are first ranked by past return performance and then by nearness to their 52-week high was applied. Stocks were ranked by nearness to 52-week high first and then by the past return performance. More, 30% of stocks with the highest/lowest past returns or nearness to the 52-week high were chosen, instead of the 10% usually used, in order to include more stocks in the double -sorted portfolios. The investment strategies apply to all US stocks from 1965 to 2018 and data is collected from CRSP on a monthly and daily frequency.

The results show that momentum returns are significantly affected by investor sentiment. Following an optimistic period, momentum returns are significantly higher and more positive than following a pessimistic period. The high momentum returns during an optimistic period are attributed to the loser portfolio return continuations, while during the pessimistic period winners and losers produce very high return continuations and reversals respectively. Moreover, momentum profits decrease dramatically when investor sentiment is pessimistic. These findings are in line with those of Antoniou et al. (2013), who show that momentum is driven by the loser portfolio in optimistic sentiment periods and the winner portfolio in pessimistic sentiment periods. Investor sentiment is also important for the 52-week high momentum strategy. Following an optimistic period, the 52-week high momentum portfolio yields significantly higher and positive returns than following a pessimistic period. The large 52-week high momentum returns, during an optimistic period, are also attributed to the loser portfolio return continuations, while during the pessimistic period near and far stocks generate very high return continuations and reversals, respectively. When investor sentiment is pessimistic, the 52-week high momentum portfolio yields highly negative returns for the

shorter holding periods. These findings show that both momentum and 52-week high strategies are strongly affected by investor sentiment, which indicates that these specific anomalies are driven by behavioural aspects such as the disposition effect, anchoring and cognitive dissonance. Sorting by nearness of the 52-week high enhances momentum returns which is in line with the findings of George and Hwang (2004).

To improve the robustness of this results, a double-sort portfolio strategy was employed which ranks first by past returns and then by nearness to the 52-week high and vice versa. Applying a 52-week high (near minus far) strategy within the winner portfolio generates considerably higher and positive returns than applying the 52-week high strategy within the loser portfolio. When considering optimistic and pessimistic investor sentiment, the results change. During an optimistic period, the near minus far portfolio generates highly positive returns which are attributed to the high return continuations of the near portfolio within past winners and the strong return continuations of the far portfolio within past losers. So, following optimistic periods, investors pay significant attention to the stocks' 52-week high position along with whether the stock is winning or losing over the past 12-months. In pessimistic periods, however, investors do not pay attention to or are reluctant to act upon 52-week high information. More importantly, the pessimistic investor sentiment enhances winner portfolio continuations and loser portfolio reversals but get only small differences in returns between the near and far portfolio and especially at longer holding periods. Therefore, investors are reluctant to act upon information relating to the stocks' proximity to the 52-week high except when in an optimistic period. These findings are in line with the findings of Hao et al. (2018) that the 52-week high is a better predictor for future returns, however, this result show that this is true mainly in optimistic periods.

Employing a momentum strategy having already controlled for 52-week high reference point yields significantly higher and positive returns for the near portfolio compared to the far portfolio. However, in an optimistic period, momentum returns are significantly higher and positive for the far portfolio compared to the near one. This result is attributed to the strong return continuation of losers within the far portfolio and the pronounced cognitive dissonance effect (bad news contradicts the positive investor sentiment). In a pessimistic period, stocks that are near their 52-week high show positive momentum returns, while stocks that are far from their 52-week high produce negative momentum returns.

This result is attributed to the strong return continuation of winners within the near portfolio and the pronounced cognitive dissonance effect (good news contradicts the pessimistic investor sentiment). Overall, the results show that investors who primarily focus on the stocks' position relative to their 52-week high will make a positive momentum return due to winners in pessimistic periods and due to losers in optimistic periods. These results are consistent and provide further support to the cognitive dissonance effect of Antoniou et al. (2013). Finally, the findings are novel and show that anchoring reinforces the disposition effect, while investor sentiment has the ability to override anchoring and to either weaken or strengthen the disposition effect. This study gives a better understanding of momentum returns, anchoring and the role of investor sentiment in terms of predicting future return continuations or reversals.

The results from the Fama-MacBeth cross-sectional regressions enable us to compare the two strategies simultaneously and control for the effects of firm size and bid-ask bounce. The results show that the dominance of the 52-week high strategy is stronger in risk-adjusted returns than in raw returns. For example, holding a self-financing 52-week high momentum portfolio for 6-months yields 0.429% per month, which is much greater than 0.296% per month earned by JT momentum portfolio. Stocks that are far from the 52-week high yield negative and significant returns across all holding periods indicating that stocks that trade far from their 52-week are due for more negative news regardless of whether the same stocks have experienced gains (winners) or losses (losers) in the past. Moreover, the regression results show that the 52-week high strategy yields higher returns than the momentum strategy in optimistic sentiment periods and across all the different holding periods. Finally, the persistence analysis shows significant reversals of momentum returns in years two and five, while for the 52-week high momentum portfolio there is no evidence of significant reversals in any of the years examined.

One of the practical implications of this chapter is that testing multiple variables simultaneously can produce significant results that pave the way for more research by combing multiple existing variables to examine their relative impact and ultimately find the variable that has the most effect on momentum. For investors, one practical implication is that they can take advantage of the fact that cognitive dissonance overrides the effect of anchoring and the disposition effect. In other words, when during optimistic (pessimistic) periods, winners (loser) stocks will produce higher returns than stocks that are near their 52-week high. Thus, investors

buying or selling stocks should pay more attention to the current sentiment rather than the stocks' position to its 52-week high.

More research is required using the methodology of combining and analysing multiple explanatory factors simultaneously. As this chapter has established, explanatory variables such as disposition effect, anchoring or cognitive dissonance do not have an equal impact on future returns. Studying multiple explanatory variables at the same time would refine the list of variables that have the most impact on future returns. That said, a limitation of this chapter is that it has only considered three effects – disposition, anchoring and cognitive dissonance – and thus the findings are limited to these variables alone. Another limitation is that investor sentiment data is available only for a limited time period and this thus the findings will be limited to the same period. Moreover, the sentiment data has lag – it only indicates the sentiment of the market after the fact – and thus it would be hard for investors to determine current sentiment which in turn makes it hard to make decisions based on it.

4.8 Appendices

Table 4.A1

Market momentum

Cross sectional momentum is formed based on observation period J months and holding period K months. J and K represent the different holding and observation period strategies. Stocks are ranked based on their past performance over J months in ascending order. 3 equally weighted portfolios are formed based on the past J months performance. Where P1 is the loser portfolio and P3 is the winning portfolio. Stocks with the most returns over the observation period J months (P3) are bought and stocks with the lowest performance over J months is sold (P1) while skipping one month after the observation period. The average monthly returns are presented in this table. The sample period is January 1965 to December 2018. Optimistic and pessimistic periods are formed following Antoniou et al. (2013).

Portfolio	***K***	3	6	9	12
Market	L	0.0067	0.0079	0.0087	0.0095
	W	0.0124	0.0118	0.0112	0.0106
	W-L	0.57%	0.39%	0.24%	0.11%
	Ann	7.03%	4.84%	2.94%	1.29%
Optimistic	L	-0.0046	-0.0015	0.0018	0.0041
	W	0.0083	0.0086	0.0104	0.0112
	W-L	1.29%	1.01%	0.86%	0.71%
	Ann	16.57%	12.82%	10.85%	8.84%
Pessimistic	L	0.0212	0.0177	0.0141	0.0149
	W	0.0193	0.0178	0.0165	0.0168
	W-L	-0.19%	0.01%	0.24%	0.19%
	Ann	-2.23%	0.13%	2.90%	2.30%

Table 4.A2

52-week high strategy

Cross-sectional of 52-week high momentum is formed based on observation period 12 months and holding period K months. Stocks are ranked based on their nearness to their 52-week high over the past 12 months in ascending order. 3 equally weighted portfolios are formed based on the past 12 months nearness of 52-week high. Where P1 is the far portfolio and P3 is the near portfolio. Stocks that are the closest to their 52-week high are bought and stocks that are the farthest from 52-week high are sold while it skips one month after the observation period. The average monthly returns are presented in this table. One month is skipped after the observation period. The sample period is January 1965 to December 2018. Optimistic and pessimistic periods are formed following Antoniou et al. (2013).

Portfolio	***K***	3	6	9	12
Market	F	0.0063	0.0067	0.0074	0.0082
	N	0.0122	0.0119	0.0116	0.0111
	N-F	0.59%	0.52%	0.42%	0.30%
	Ann	7.25%	6.45%	5.16%	3.61%
Optimistic	F	-0.0067	-0.0047	0.0001	0.0023
	N	0.0116	0.0121	0.0131	0.0137
	N-F	1.83%	1.67%	1.29%	1.14%
	Ann	24.34%	22.05%	16.66%	14.62%
Pessimistic	F	0.0215	0.0177	0.0140	0.0152
	N	0.0163	0.0158	0.0149	0.0151
	N-F	-0.52%	-0.19%	0.09%	-0.01%
	Ann	-6.03%	-2.25%	1.03%	-0.11%

Table 4.A3

Momentum over 52-week high (overall period)

In this analysis it first sort by past returns (12 months). It then divides the market into three deciles top 30% and bottom 30%. Within the winner and loser portfolio, it sorts by the nearness of the 52-week high. It reports the near and far portfolios return within the winner and loser portfolio. The near and far portfolio represents top 30% and bottom 30%. It run this for the period from 1965 to 2018.

Portfolio	***K***	3	6	9	12
	52-week				
Winner	Far	0.0096	0.0090	0.0084	0.0082
	Near	0.0137	0.0134	0.0129	0.0121
	F-N	0.41%	0.44%	0.45%	0.39%
	Ann	5.00%	5.40%	5.47%	4.79%
Loser	Far	0.0045	0.0062	0.0071	0.0085
	Near	0.0085	0.0094	0.0098	0.0101
	F-N	0.40%	0.32%	0.27%	0.16%
	Ann	4.92%	3.89%	3.28%	1.96%

Table 4.A4

Momentum over 52-week high (winner portfolio)

In this analysis it looks at the winner portfolio sorted by past returns (12 months). It then divides the market into three deciles top 30% and bottom 30%. Within the winner and loser portfolio, it sorts by the nearness of the 52-week high. It reports the near and far portfolios return within the winner and loser portfolio. The near and far portfolio represents top 30% and bottom 30%. It used investor sentiment rolling average developed by Antoniou et al. (2013). It assigns weights for each month on the past three months to measure current month's sentiment. It run this for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
	52-week				
Optimistic	Far	0.0017	0.0023	0.0085	0.0074
	Near	0.0128	0.0129	0.0153	0.0139
	N-F	1.10%	1.06%	0.68%	0.65%
	Ann.	14.08%	13.46%	8.46%	8.09%
Pessimistic	Far	0.0193	0.0168	0.0135	0.0154
	Near	0.0185	0.0178	0.0158	0.0175
	N-F	-0.08%	0.10%	0.23%	0.21%
	Ann.	-0.95%	1.16%	2.78%	2.52%

Table 4.A5

Momentum over 52-week high (loser portfolio)

In this analysis it looks at the loser portfolio sorted by past returns (12 months). It then divides the market into three deciles top 30% and bottom 30%. Within the winner and loser portfolio, it sorts by the nearness of the 52-week high. It reports the near and far portfolios return within the winner and loser portfolio. The near and far portfolio represents top 30% and bottom 30%. It used investor sentiment rolling average developed by Antoniou et al. (2013). Analysis assign weights for each month on the past three months to measure current month's sentiment. Analysis run this for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
	52-week				
Optimistic	Far	-0.0123	-0.0080	-0.0022	0.0016
	Near	0.0032	0.0047	0.0061	0.0073
	N-F	1.56%	1.27%	0.83%	0.58%
	Ann.	20.37%	16.36%	10.38%	7.13%
Pessimistic	Far	0.0241	0.0177	0.0129	0.0143
	Near	0.0177	0.0160	0.0132	0.0138
	N-F	-0.65%	-0.17%	0.04%	-0.05%
	Ann.	-7.51%	-1.97%	0.43%	-0.63%

Table 4.A6

52-week high over momentum (overall period)

In this analysis it first sort by nearness of the 52-week high by dividing the market into three deciles top 30% and bottom 30%. Within the near and far portfolio, it sorts by the past returns. Analysis report the winner and loser portfolios returns within the near and far portfolios. The winner and loser portfolio represent top 30% and bottom 30% of past returns. Analysis run this for the period from 1965 to 2018.

Portfolio	***K***	3	6	9	12
	52-week				
Near	L	0.0095	0.0102	0.0104	0.0103
	W	0.0148	0.0142	0.0133	0.0123
	W-L	0.54%	0.40%	0.29%	0.20%
	Ann	6.62%	4.94%	3.55%	2.43%
Far	L	0.0047	0.0063	0.0076	0.0089
	W	0.0075	0.0074	0.0073	0.0076
	W-L	0.28%	0.11%	-0.03%	-0.13%
	Ann	3.38%	1.33%	-0.30%	-1.51%

Table 4.A7

52-week high over momentum (near portfolio)

In this analysis looks at the near portfolio sorted by 52-week high. Analysis then divide the market into three deciles top 30% and bottom 30%. Within the Near portfolio, analysis sort by the past returns (12 months). Analysis report the winner and loser portfolios returns within the near portfolio. The winner and loser portfolio represent top 30% and bottom 30%. Analysis used investor sentiment rolling average developed by Antoniou et al. (2013). Analysis assign weights for each month on the past three months to measure current month's sentiment. Analysis run this for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
	52-week				
Optimistic	L	0.0100	0.0116	0.0125	0.0136
	W	0.0121	0.0117	0.0127	0.0126
	W-L	0.21%	0.01%	0.02%	-0.10%
	Ann	2.56%	0.12%	0.23%	-1.19%
Pessimistic	L	0.0125	0.0125	0.0116	0.0121
	W	0.0211	0.0198	0.0185	0.0183
	W-L	0.86%	0.74%	0.69%	0.62%
	Ann	10.82%	9.20%	8.61%	7.70%

Table 4.A8

52-week high over momentum (far portfolio)

In this analysis looks at the far portfolio sorted by 52-week high. Analysis then divide the market into three deciles top 30% and bottom 30%. Within the far portfolio, analysis sort by the past returns (12 months). Analysis report the winner and loser portfolios returns within the far portfolio. The winner and loser portfolio represent top 30% and bottom 30%. Analysis used investor sentiment rolling average developed by Antoniou et al. (2013). Analysis assign weights for each month on the past three months to measure current month's sentiment. Analysis run this for the period from 1965 to 2018.

Sent.	***K***	3	6	9	12
	52-week				
Optimistic	L	-0.0115	-0.0067	-0.0009	0.0024
	W	-0.0022	-0.0012	0.0020	0.0044
	W-L	0.92%	0.55%	0.29%	0.20%
	Ann	11.65%	6.79%	3.55%	2.41%
Pessimistic	L	0.0244	0.0182	0.0137	0.0153
	W	0.0193	0.0164	0.0134	0.0144
	W-L	-0.51%	-0.19%	-0.03%	-0.09%
	Ann	-5.91%	-2.22%	-0.37%	-1.06%

Table 4.A9

Fama–Macbeth regression (one-month skip)

In each month t from January 1965 to December 2018, analysis perform the following 3, 6, 9 or 12 cross-sectional regressions (for $j = 1$ to $j = 3$ or $j = 1$ to $j = 6$ or $j = 1$ to $j = 9$ or $j = 1$ to $j = 12$): $ri,t = b0jt + b1jt\ ri,t-1 + b2jt\ SIZEi,t-1 + b3jt\ JTHi,t-j + b4jt\ JTLi,t-j + b5jt\ 52WHHi,t-j + b6jt\ 52WHLi,t-j + \varepsilon i,t$, where ri,t is the return of stock i in month t; $SIZEi,t-1$ is the natural logarithm of stock i's market capitalization at the end of previous month; and $JTWi,t-j$ ($JTLi,t-j$) is a dummy variable that equals 1 if stock i's JT measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise; $52WHNi,t-j$ ($52WHFi,t-j$) is a dummy variable that equals 1 if stock i's 52WH measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise. In each month t, analysis estimate 3 or 6 or 9 or 12 cross-sectional regressions for (for $j = 1$ to $j = 3$ or $j = 1$ to $j = 6$ or $j = 1$ to $j = 9$ or $j = 1$ to $j = 12$) and average the corresponding coefficient estimates. Numbers in the parentheses are the P-values calculated using Newey and West's (1987) robust standard errors.

Variable	Raw return (2,4)	Raw return (2,7)	Raw return (2,10)	Raw return (2,13)
Intercept	0.0302	0.0300	0.0292	0.0283
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$R_{i,t-1}$	-0.0517	-0.0519	-0.0519	-0.0518
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	-0.0017	-0.0016	-0.0015	-0.0015
P-value	(0.0000)	(0.0000)	(0.0000)	(0.0002)
JTW	0.0024	0.0015	0.0007	0.0002
P-value	(0.0085)	(0.0893)	(0.3779)	(0.7825)
JTL	-0.0013	-0.0007	-0.0002	0.0002
P-value	(0.0754)	(0.3200)	(0.8122)	(0.7766)
52WHN	0.0013	0.0014	0.0015	0.0012
P-value	(0.0574)	(0.0355)	(0.0208)	(0.0459)
52WHF	-0.0036	-0.0032	-0.0027	-0.0020
P-value	(0.0006)	(0.0018)	(0.0062)	(0.0400)
JTW-JTL	0.0037	0.0022	0.0009	0.0000
P-value	(0.0049)	(0.0793)	(0.4376)	(0.9731)
52WHN-52WHF	0.0049	0.0045	0.0041	0.0032
P-value	(0.0023)	(0.0031)	(0.0049)	(0.0264)

Table 4.A10

Fama–Macbeth regression on investor sentiment (one-month skip analysis)

Cross-sectional regressions conditional on different sentiment states. In each month t from July 1965 to December 2010, analysis perform the following 6 or 12 cross-sectional regressions (for $j = 2$ to $j = 7$ or $j = 2$ to $j = 13$): $ri,t = b0jt + b1jt\ ri,t-1 + b2jt\ SIZEi,t-1 + b3jt\ JTHi,t-j + b4jt\ JTLi,t-j + +b5jt\ 52WHHi,t-j + b6jt\ 52WHLi,t-j + \varepsilon i,t$, where ri,t is the return of stock i in month t; $SIZEi,t-1$ is the natural logarithm of stock i's market capitalization at the end of previous month; $JTHi,t-j$ ($JTLi,t-j$) is a dummy variable that equals 1 if stock i's JT measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise and $52WHHi,t-j$ ($52WHLi,t-j$) is a dummy variable that equals 1 if stock i's 52WH measure is ranked at the top (bottom) 30% at the end of month $t-j$, and zero otherwise. In each month t, analysis estimate 6 (or 12) cross-sectional regressions for $j = 2$ to $j = 7$ (or $j = 2$ to $j = 13$) and average the corresponding coefficient estimates. Once obtaining the time series of the average coefficients from the George–Hwang style regressions, analysis regress these coefficients on high, mild, and low sentiment dummies with no intercept to test whether momentum profits in each sentiment state are equal to zero. To test whether the average returns of the momentum strategies in high-sentiment periods are significantly different from that in low-sentiment periods, analysis regress the time series of average monthly momentum profits on high and mild sentiment dummies with a constant. Numbers in the parentheses are the P-values calculated using Newey and West's (1987) robust standard errors.

Panel A

Variable	Raw return (1,3)				Raw return (1,6)			
	High	Mild	Low	H-L	High	Mild	Low	H-L
JTW	0.0016	0.0040	0.0019	-0.0002	0.0000	0.0028	0.0014	-0.0015
P-value	(0.2850)	(0.0233)	(0.2070)	(0.9102)	(0.9820)	(0.0515)	(0.3243)	(0.5225)
JTL	-0.0048	-0.0023	0.0017	-0.0065	-0.0038	-0.0012	0.0015	-0.0053
P-value	(0.0004)	(0.0181)	(0.3850)	(0.0062)	(0.0173)	(0.1954)	(0.3589)	(0.0209)
52WHN	0.0046	0.0011	-0.0024	0.0070	0.0048	0.0012	-0.0020	0.0068
P-value	(0.0003)	(0.2671)	(0.0934)	(0.0003)	(0.0004)	(0.1726)	(0.1663)	(0.0005)
52WHF	-0.0078	-0.0022	0.0005	-0.0083	-0.0073	-0.0023	-0.0002	-0.0071
P-value	(0.0004)	(0.1787)	(0.8064)	(0.0046)	(0.0015)	(0.1200)	(0.9156)	(0.0166)
JTW-JTL	0.0065	0.0063	0.0002	0.0063	0.0037	0.0039	-0.0001	0.0038
P-value	(0.0054)	(0.0037)	(0.9527)	(0.0974)	(0.1903)	(0.0297)	(0.9780)	(0.3110)
52WHN-52WHF	0.0124	0.0033	-0.0029	0.0153	0.0121	0.0035	-0.0018	0.0139
P-value	(0.0001)	(0.1659)	(0.3644)	(0.0008)	(0.0004)	(0.0982)	(0.5752)	(0.0028)

Panel B

Variable	Raw return (1,9)				Raw return (1,12)			
	High	Mild	LOW	H-L	High	Mild	LOW	H-L
JTW	0.0004	0.0011	0.0012	-0.0008	-0.0001	0.0003	0.0012	-0.0013
P-value	(0.7574)	(0.3986)	(0.3936)	(0.6863)	(0.9485)	(0.8154)	(0.4648)	(0.5450)
JTL	-0.0026	0.0000	0.0000	-0.0026	-0.0026	0.0005	0.0001	-0.0027
P-value	(0.1191)	(0.9671)	(0.9567)	(0.1599)	(0.0838)	(0.5634)	(0.9108)	(0.1028)
52WHN	0.0046	0.0014	-0.0011	0.0056	0.0038	0.0013	-0.0011	0.0049
P-value	(0.0004)	(0.0898)	(0.3971)	(0.0019)	(0.0074)	(0.0862)	(0.3751)	(0.0093)
52WHF	-0.0053	-0.0020	-0.0017	-0.0035	-0.0043	-0.0016	-0.0014	-0.0029
P-value	(0.0046)	(0.1782)	(0.2930)	(0.1524)	(0.0349)	(0.2630)	(0.3775)	(0.2618)
JTW-JTL	0.0030	0.0012	0.0012	0.0018	0.0025	-0.0002	0.0011	0.0014
P-value	(0.2201)	(0.4913)	(0.5179)	(0.5455)	(0.2743)	(0.8656)	(0.5527)	(0.6466)
52WHN-52WHF	0.0098	0.0034	0.0006	0.0092	0.0082	0.0029	0.0003	0.0078
P-value	(0.0005)	(0.1036)	(0.8229)	(0.0215)	(0.0100)	(0.1469)	(0.9086)	(0.0631)

Chapter Five: Conclusion

This study was motivated by the fact that despite the availability of advanced statistical modelling, scholars struggle to find a clear source for momentum returns. This simple, yet highly profitable and puzzling strategy has created a lot of confusion and debate in academia. Whether it is driven by risk factors or behavioural factors is still a heated argument between scholars. Even Eugene Fama has said in an interview that the puzzle of momentum gives him a problem,[55] putting in perspective just how puzzling momentum returns, and that their source is yet to be found even three decades since research began on the topic. Even Jegadeesh and Titman (1993), who believed that the source of momentum returns is based on how investors underreacted to new information, have since been faced with a lot of counter arguments in the literature. The current literature is not trying to find a clear or specific variable that has a causal relationship with momentum but rather is trying to establish whether momentum is plainly based on either risk or behavioural factors. Supporters of each argument have produced a lot of studies that specifically tackle this question.

In general, the risk-based argument is driven by the idea of efficient market, at least in its initial principles. After a while, Fama (1998) argued that even though his three-factor model could not explain momentum returns, nor his five-factor model after that, that is not enough to dismiss the theory of efficient markets or simply accept the behavioural explanation. He argues that both underreaction and overreaction occur randomly and that this is enough reason to believe that the efficient market is working and it does not need to explain momentum returns. The inability of the three-factor model (1993) and the five-factor model (2016) to explain momentum could be because the variables used in these factor models are few and have limited explanatory powers. This does not mean, however, that it is driven by behavioural models. He also accuses behavioural models of ambiguity and of being hard to implement. Over the past three decades, behavioural theory supporters have strongly argued that momentum is driven by behavioural biases, whether those biases are in the form of investor overconfidence and self-

[55] Eugene Fama is interviewed by Richard Roll for the American Finance Association's 'Masters of Finance' series. Recorded 15 August 2008.

attribution (Daniel, Hirshleifer and Subrahmayan, 1998) or by conservatism and representative bias (Barberis, Shleifer and Vishny 1998), both of which concern how investors underreact to new information. Hong and Stein (1999) show that underreaction to news is based on how information diffuses in the market. If information diffuses quickly, it reaches the majority of investors, who act upon the information, which leads to less underreaction and thus less momentum. However, when news diffuses gradually then it reaches investors in waves and they act upon it accordingly, which creates more underreaction and higher momentum. Such theories have always been accused of being hard to implement and ambiguous and they are sensitive to methodology.

Today, scholars are still investigating the source of momentum returns, which is an indication that all of the studies thus far have yet to discover a clear source of momentum returns. However, some studies have argued that momentum returns have disappeared since investors started acting upon it (Hwang, Rubesam, 2015; Bhattacharya, Li and Sonaer, 2017). If indeed momentum has disappeared, then there is no need to study it any further. Moreover, momentum disappearance settles the argument of whether momentum is driven by behavioural or risk factors, because it shows that momentum was a periodic phenomenon and not a continuous one. This motivated the second chapter, which looked at whether momentum still exists three decades after the first paper was published.

The majority of the studies in the momentum literature tackles the source of momentum by looking at one or two variables at a time. Only a few papers have looked at a set of variables in their attempt to explain momentum returns (Cooper, Gutierrez and Hameed, 2004). Even when scholars use multiple variables at the same time, they fail to distinguish whether one variable has superior effect above the others. This motivates the study of a set of variables that are correlated with each other on momentum returns. The third chapter analyzed corporate governance structure, measured by the G-index of Gompers, Ishii and Metrick (2003). Besides reports that momentum has been eradicated, other studies have explained momentum as being another anomaly of the market. That explanation could take the form of industry momentum (Moskowitz and Grinblatt, 1999) or time series momentum (Moskowitz, Ooi and Pedersen, 2012). In addition, momentum has been explained as being the product of the 52-week high strategy (George and Hwang, 2004; George, Hwang and Li, 2014). This motivated the fourth chapter, which discussed whether the 52-week high strategy affects momentum and how this

effect changes during optimistic and pessimistic periods. This chapter looked at multiple variables that have an established relationship with momentum returns that have yet to be studied simultaneously in order to establish whether one variable has stronger effect on momentum returns than the others.

5.1 Thesis contribution

As stated above, the second chapter tackled the existence of momentum strategy in a recent time period. It also discussed the effect of investor sentiment. This chapter used the time period between 1990 to 2018 to test whether momentum has actually disappeared since the 1990s as suggested in other work, or if that result is sensitive to the time period tested. The model used in this chapter combined momentum strategy with controls for investor sentiment. The first analysis in the chapter implemented the conventional momentum strategy of Jegadeesh and Titman (1993) from 1990 to 2018. This analysis showed that momentum exists during this period. However, when regressed on the three- and five-factor models of Fama and French (1993, 2016) it shows positive but insignificant alphas. The same analysis was implemented separately for the winner and loser portfolio, with similar results. The second analysis examined the same pattern during three subperiods from 1990 to 1999, 2000 to 2009 and 2010 to 2018. All of the three subperiods exhibit momentum but after regressing returns on the risk factors, two of the three are insignificant positive alphas. The subperiod between January 2010 and December 2018 shows significant positive alphas. This result indicates that momentum returns still exists and produce abnormal returns. This chapter argued, based on such results, that momentum returns may have disappeared between January 1990 and December 2009 as previously established but that it has resurfaced since. Such results grant scholars a reason to continue research on momentum returns. Investor sentiment is controlled for in this analysis, which measures whether behavioural biases of investors affect their reaction to news. The analysis controls for investor sentiment by looking at Jegadeesh and Titman (1993) momentum returns during both optimistic and pessimistic periods. Previous studies have shown that momentum only occurs during optimistic periods. However, this analysis shows that momentum pattern exists in both optimistic and pessimistic periods, although it is higher during optimistic periods. This is a novel finding and contributes to both the investor sentiment and momentum literatures. This chapter contributes to the existing literature by analyzing an

extended period since the 1990s and by showing that momentum still exists in the market and produce abnormal returns during the subperiod between January 2010 and December 2018. In addition, this chapter shows that momentum does not only occur during optimistic periods but it also presents in pessimistic periods. However, momentum returns during pessimistic periods are significantly lower than in optimistic periods.

The third chapter introduced a novel model in testing momentum returns. This model is based on a collection of variables that are correlated together and measured by an index. This is one of a small number of studies that uses collective variables in testing momentum returns and the first study to analyze the effect of corporate governance on momentum returns. The G-index is widely used to measure a firm's level of corporate governance. It gauges whether the firm has democratic or dictatorship shareholder's rights. Previous studies have shown that companies with democratic shareholder rights structures exhibit higher returns than firms with dictatorship structures. A trading strategy that buys a democracy portfolio and shorts a dictatorship portfolio exhibits abnormal returns.

The analysis implements the momentum strategy in both democracy and dictatorship portfolios. This chapter showed that corporate governance structure, or shareholders rights, has an impact on momentum returns. Implementing the momentum trading strategy on portfolios of stocks with different shareholders rights shows that for stocks with a dictatorship corporate governance structure (G14), past winner and loser stocks produce significant positive excess returns during an expansionary and recessionary period respectively. When examining return continuation and reversal for stocks with strong and weak shareholders rights, it is winning stocks with weak shareholders rights (G14) that produce positive and significant alphas during the expansionary period, and losing stocks of weak shareholders rights (G14) that generate positive and significant alphas during the recessionary period. The risk factor analysis shows that investors buying up G14 winners during good times will even look at stocks with low profitability (apart from being small and highly correlated with the market index), while when they sell G14 losers, at bad times they particularly choose stocks of low profitability, low investment, and high exposure with the market portfolio. As far as extreme winners and losers are concerned, G14 winners give positive and significant alphas for the expansionary period, indicating that investors are reluctant to buy extreme past winners in the G14 (dictatorship) category, which often leads to mispricing relative to risk factor exposure. Moreover, extreme

G14 losers produce insignificant alphas for both the expansionary and recessionary periods. On the other hand, extreme G5 winners produce a few positive and significant alphas, indicating that investors are less reluctant to buy extreme winning stocks in the G5 (democracy) category and leading to a few instances of mispricing either in good or bad times. The mispricing of G14 stocks could potentially be attributed to the fact that companies with weak shareholder rights or corporate governance structure (G14) are riskier, in terms of investment recovery, and less transparent, in terms information disclosure. Thus, investors are more (less) reluctant to buy (sell) G14 winners (losers) when further good (bad) news arrives in the market, leading to mispricing (significant negative/positive alphas). Companies with weak shareholders rights or corporate governance structure might be of less interest to financial analysts, and so a smaller number of them may follow these stocks on a regular basis. As a result, news about these companies takes longer to disseminate and to be incorporated into current prices, pushing G14 stocks away from fundamental prices for longer periods.

The fourth chapter tackled the 52-week high and momentum strategies along with the effect of investor sentiment. As stated previously, one explanation for momentum returns is that they are simply the product of the 52-week high strategy. In other words, the majority of momentum returns are driven by stocks that are near their 52-week high. However, the 52-week high strategy is based on buying stocks that are close to their 52-week high but not necessarily selling the ones that are far from it. Since the momentum strategy has two components, buying the winner portfolio and selling the loser portfolio, it is crucial to analyze how previous winners and previous losers act near these reference points. In addition, both portfolios are measured during optimistic and pessimistic periods to see if investor sentiment effect overrides the effect of the 52-week high. The model implemented in this chapter looks at the Jegadeesh and Titman momentum strategy and the 52-week strategy separately. Then it tests whether winners or losers in the JT strategy are tilted towards stocks that are near or far from their 52-week high. It also analyzes whether stocks that are near their 52-week high are winners or losers. The results show that momentum returns are significantly affected by investor sentiment. Following an optimistic period, momentum returns are significantly higher and more positive than following a pessimistic period. The high momentum returns during an optimistic period are attributed to the loser portfolio return continuations, while during the pessimistic period winners and losers produce very high return continuations and reversals respectively. Moreover, momentum profits decrease dramatically when investor sentiment is pessimistic.

These findings are in line with the findings of Antoniou et al. (2013), who show that momentum is driven by the loser portfolio in optimistic sentiment periods and the winner portfolio in pessimistic sentiment periods. Investor sentiment is also important for the 52-week high momentum strategy. Following an optimistic period, the 52-week high momentum portfolio yields significantly higher and positive returns than following a pessimistic period. The large 52-week high momentum returns, during an optimistic period, are also attributed to the loser portfolio return continuations, while during the pessimistic period near and far stocks generate very high return continuations and reversals, respectively. When investor sentiment is pessimistic, the 52-week high momentum portfolio yields highly negative returns for the shorter holding periods. These findings show that both momentum and 52-week high strategies are strongly affected by investor sentiment, which indicates that these specific anomalies are driven by behavioural aspects such as the disposition effect, anchoring and cognitive dissonance. Sorting by nearness of the 52-week high enhances momentum returns in line with the findings of George and Hwang (2004). In this chapter, three variables that have an established relationship with momentum returns were examined. Past returns, the nearness to the 52-week high and investor sentiment were examined all simultaneously. Previous studies have tackled these variables separately but to my knowledge this is the first study that looks at all three at the same time. Analyzing these variables at the same time helps to understand which of these variables have superior effect on the other variables if any. This chapter tackled momentum and the 52-week high trading strategy. Results show that investors react differently based on behavioural responses to winner and loser stocks. Previous studies have found that investor sentiment affects both winners and loser stocks the same way. These results instead find that investors react to winner and loser stocks to different degrees. For winners, past returns information dominates the 52-week high position, but in losers, there does not seem to be an impact. The purpose of this chapter was to show how the mixture of behavioural biases affect future returns. The double sorting strategy implemented in this study creates a setting that makes investors exhibit all of these behavioral biases at the same time. When analyzing near and far portfolio for past winners during optimistic periods, this setting creates a set of behavioral biases that are disposition effect, anchoring effect and cognitive dissonance. Analyzing the returns of this specific settings helps to better understand which of these biases has the most effect on future returns. Based on the results, cognitive dissonance has the most effect on future returns between these three variables. Moreover, in a setting where investors do not experience cognitive dissonance, future returns generate the lowest return continuation.

Overall, the results show that investors who primarily focus on the stocks' position relative to their 52-week high will make a positive momentum return due to winners in pessimistic periods and due to losers in optimistic periods. These results are consistent and provide further support to the cognitive dissonance effect demonstrated by Antoniou et al. (2013). These findings are novel and show that anchoring reinforces the disposition effect, while investor sentiment has the ability to override anchoring and to either weaken or strengthen the disposition effect. This study gives a better understanding of momentum returns, anchoring and the role of investor sentiment in terms of predicting future return continuations or reversals.

5.2 Study implications, limitations and future research

This study results in some practical implications. In the second chapter, it shows that investors can continue, as they have been doing for the past three decades, to trade on momentum strategy. Even though momentum might not be as profitable as the overall market in some periods, in other periods it generates abnormal returns without bearing additional risks, as measured by the three- and five-factor models. As stated previously, the results from this chapter pave the way for future researchers to continue their journey on finding the source of momentum returns as momentum is still exists. There are some limitations, however, one being that the study was conducted in the US market alone and might not be applicable elsewhere. Future research could make these findings more robust by looking at whether momentum still exists outside the US market.

The third chapter, shows that corporate governance levels not only affect how the firm is perceived by investors but also affects how investors react when buying and selling the firms' stocks. It shows that when a firm has dictatorship shareholders rights, investors are reluctant to further buy its winning stocks, even when it already winning with good news, because of fears of their dictatorship shareholders rights. Such implications could cost firms that are looking to raise capital as less investor are enthusiastic about the firm's stock. There are a couple of limitations to this chapter. There is only limited data on corporate governance measured by the G-index. This chapter has analyzed the full time period where the G-index data is available. Had more data been available for longer period, this study could have been more robust. Although corporate governance structure seems to be related to returns behaviour of past losers and winners, future research combining other sources of momentum with corporate governance

will contribute further to the factors determining stock return continuations and reversals. Moreover, future research could make these findings more robust by looking at different indexes that measures corporate governance levels. Ones that have an extended dataset and might include more variables. This study was implemented on the US market; future research could tackle the same relationship between corporate governance and momentum in different countries.

One of the practical implications of the fourth chapter is that testing multiple variables simultaneously can produce significant results. Such results pave the way for more research in the area by combing multiple existing variables to understand their relative importance and ultimately find the variable that has the most effect on momentum. For investors, one practical implication is that they can take advantage of the fact that cognitive dissonance overrides the effect of anchoring and disposition effect. In other words, when during optimistic (pessimistic) periods, winners (loser) stocks will produce higher returns than stocks that are near their 52-week high. Thus, investors buying or selling stocks should pay more attention to the current sentiment rather than the stocks' position to its 52-week high.

More research is needed that uses the methodology of combining and analysing multiple explanatory factors simultaneously. As the chapter has established, explanatory variables such as disposition effect, anchoring or cognitive dissonance do not have an equal impact on future returns. Studying multiple explanatory variables at the same time will refine the list of variables that have the most impact on future returns. However, one limitation of this chapter is that it only studies three effects – disposition, anchoring and cognitive dissonance – and thus the findings of this chapter is limited to these variables alone. Another limitation is that investor sentiment data is limited to the time period and this thus the finding will be limited to the same period. Moreover, the sentiment data has lag – it only indicates the sentiment of the market after the fact – thus it would be hard for investors to determine the current sentiment which in turn will make it hard to make decisions based on it.

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