Investor Sentiment, Anchoring, and Momentum Returns

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Abstract

We hypothesize that anchoring enhances the disposition effect, while investor sentiment likely strengthens (or weakens) this effect when news contradict (or align with) the prevailing investor sentiment. This study examines the profitability of momentum strategies based on past return performance and/or proximity to the 52-week high across different sentiment states. We find that momentum returns are consistently higher following periods of optimism compared to pessimism, and are greater for stocks sorted by closeness to the 52-week high rather than by past performance. The double-sort strategy shows that a near minus far strategy within past winners or losers generates positive and significant returns following an optimistic sentiment period. Nearness to (farness from) the 52-week high enhances the disposition effect of past winners (losers), while the positive market sentiment attenuates (strengthens) it, giving rise to strong return continuations. Following an optimistic (pessimistic) market sentiment, a momentum strategy produces positive and significant returns for the far (near) portfolio due to strong return continuations of loser (winner) stocks. Past performance strengthens the cognitive dissonance effect of stocks trading near (or far from) the 52-week high during pessimistic (or optimistic) periods.

Keywords: Momentum, Anchoring, Disposition effect, Behavioral Finance.

JEL classification: G11, G12, G30, G40, G41, O16

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1. Introduction

Momentum strategy buys past winning stocks and shorts past losing stocks anticipating that stock prices will continue to move in the same direction in the future. The finance literature attributes excess returns gained from momentum to additional risk-taking and behavioral factors. Slowly diffusing news about future fundamentals make prices underreact in the short run and continue in the same upward and downward trend until full incorporation of new information (Hong and Stein, 1999; Hvidkjaer, 2006; Chang, Ko, Nakano and Rhee, 2018).[1] Another source of investor underreaction is the disposition effect, which is the tendency of investors to exit winning trades too soon and hold losing trades for a long time (Grinblat and Han, 2005, Frazzini, 2006).[2] Behavioral biases, such as the disposition effect, do not have an absolute effect on the investor; rather, their impact varies based on the size of gains or losses (Ahmed and Doukas, 2021). It is important to note that behavioral biases are driven by investor cognition, which could be affected by many variables.[3] One of them is anchoring. George and Hwang (2004) argued that nearness to the 52-week high is a better predictor of future returns than past returns. They show that ranking stocks based on their nearness to the 52-week high yields higher returns than ranking stocks based on past performance. This happens because investors use the 52-week high as a reference point and, thus, investment decisions are anchored onto it (Della Vedova et al., 2023, Huang et al., 2021).

Baker and Wurgler (2006) examined the effect of investor sentiment, which measures whether investors are optimistic or pessimistic about the market, in terms of predicting future returns. They find that investor sentiment affects stock returns, but the effect varies between stocks based on stock characteristics and new information about the stock. Antoniou et al. (2013) examined the effect of investor sentiment on momentum returns. Their argument is that if new information contradicts the current market sentiment, it causes cognitive dissonance and slows diffusion of such news. As a result, losers (winners) become underpriced under optimism (pessimism). Their empirical results show momentum profits mainly during optimistic periods, while short-selling constraints may impede arbitraging of losers during the same periods. Interestingly, Hao et al. (2018) examined the performance of the 52-week high momentum strategy across different investor sentiment periods. They provide evidence that the 52-week

[1] Hvidkjaer (2006) showed that, among small trades, there is an extremely sluggish reaction to the past returns. For example, an initial small-trade buying pressure exists for loser stocks, and it gradually converts into an intense selling pressure over the following year. The results were consistent with initial underreaction followed by delayed reaction among small traders.
[2] (Huang et al., 2021; Ben-David and Hirshleifer, 2012; Chang et al., 2017; Dhar and Zhu, 2006; Feng and Seasholes, 2005; Jin and Scherbina, 2011; Odean, 1998; Shapira and Venezia, 2001).
[3] For example, air pollution is shown to increase the disposition effect of investors (Massa, Zhang and Zhang, 2021).

high strategy generates higher momentum returns following high-sentiment states, while the profitability of the 52-week high momentum is robust to firm size and market states (expansionary or recessionary). These studies demonstrate that behavioral biases, such as the disposition effect and anchoring, affect future returns and possibly interact with each other.[4] However, the degree to which these behavioral biases together affect future returns during pessimistic or optimistic periods is rarely investigated. This study examines the profitability of momentum strategies based on past returns performance and proximity to the 52-week high, individually as well as jointly (double-sort strategy). We hypothesize that anchoring (trading near the 52-week high) potentially enhances the disposition effect, while investor sentiment is likely to weaken or strengthen it when news accord with or contradict the current investor sentiment, respectively. Thus, this study aims to investigate the profitability of momentum strategies across different sentiment states and to determine whether conditioning on proximity to the 52-week high, after considering past performance (or vice versa), results in incremental returns for investors during pessimistic or optimistic periods. Further, we use Fama–McBeth style regressions to test the robustness of momentum profitability in different holding periods, sentiment states, and exposure to risk factors. Finally, this study examines the persistence of momentum returns up to five years and uncovers whether traders correct their initial biases beyond year one and under different sentiment states.

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. Our findings are consistent with those of Antoniou, Doukas and Subrahmanyam (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. During an optimistic period, the 52-week high momentum portfolio yields highly positive returns; however, during a pessimistic one, the same strategy yields negative returns. The large 52-week high momentum returns, during an optimistic period, are credited to the far portfolio return continuations; however, during the pessimistic period, far

[4] Other studies have examined the overlap between disposition effect and anchoring, and how it affects future returns (Hur and Singh, 2019). Sentiment-based momentum strategy is an example that shows the explanatory power of behavioral bias on predicting future returns (Altanlar, Guo and Holmes, 2019; Wang, Su and Duxbury, 2021; Kim and Suh, 2018).

stock reversals are higher than near stock continuations. Importantly, momentum strategies based on past performance or the 52-week high are strongly affected by investor sentiment, which indicates the great impact sentiment has on behavioral biases such as anchoring and the disposition effect.

The double-sort portfolio strategy also gives very interesting results. Implementing a 52-week high strategy, within the winner (loser) portfolio, generates mild (low) positive returns. Sorting stocks by closeness to the 52-week high has a weak effect on past winners and almost no effect on past losers. Following an optimistic market sentiment, a near minus far strategy produces positive and significant returns for past winners (losers) due to the strong return continuations of near (far) stocks. Thus, positive market sentiment partly attenuates the strong disposition effect of past winners trading close to the 52-week high and strengthens the disposition effect of past losers trading far from the 52-week high.[5] During a pessimistic period, a near-minus-far strategy will produce no significant returns for past winners, and only negative returns for past losers (due to strong reversals of the far portfolio).[6] Our findings demonstrate that nearness to (farness from) the 52-week high enhances the disposition effect of past winners (losers), while market sentiment has the power to attenuate or strengthen it if recently received news agree or disagree with the current sentiment. Moreover, our results are in line with those of Hao et al. (2018), that the 52-week high is a better predictor for future returns; nevertheless, our results show that this is largely true in optimistic periods.

A momentum strategy within the near or far portfolio yields significant and positive returns mainly for the near portfolio. Anchoring makes investors increasingly hesitant to buy past winning stocks compared to past losing ones, considering they both trade close to the 52-week high. Following an optimistic (pessimistic) market sentiment, a momentum strategy produces positive and significant returns for the far (near) portfolio due to strong return continuations of loser (winner) stocks. In other words, our results indicate that investors focusing primarily on the stocks' positions relative to their 52-week highs will achieve positive momentum returns due to winners in pessimistic periods and losers in optimistic periods. Past performance

[5] Investors are increasingly reluctant to buy past winning that also trade close to the 52-week high due to anchoring; however, the positive market sentiment attenuates partly the strong disposition effect and creates enough demand pressure for prices to slowly adjust at new equilibrium levels when further good news arrive. Also, the positive market sentiment makes investors significantly more hesitant to sell past losing stocks that trade far from the 52-week high (cognitive dissonance).

[6] More, investors are increasingly reluctant to buy past winners following a pessimistic sentiment (cognitive dissonance), and nearness to the 52-week high seems to make no difference on the returns generated by winning near or far stocks. The selling pressure on past losing stocks that also trade far from their 52-week high will push market prices way below their long-run (or fundamental values), especially following pessimistic sentiment states. An increased demand for stocks trading at a capital loss makes the reversal imminent.

strengthens the cognitive dissonance effect that arises when stocks trade close to (far from) the 52-week during pessimistic (optimistic) periods. Interestingly, under optimism, a momentum strategy yields no significant returns for the near portfolio, and under pessimism, it yields no significant returns for the far portfolio. The results are consistent with those of Antoniou, Doukas, and Subrahmanyam (2013) and provide further evidence of an enhanced cognitive dissonance effect when anchoring interacts with the disposition effect under different sentiment states. This study improves the understanding of momentum returns, anchoring, and the role of investor sentiment in terms of predicting future return continuations or reversals.

The rest of the paper is organized as follows: literature review and hypothesis is presented in Section 2; data and methodology are explained in Section 3; empirical results and robustness checks are presented in Sections 4 and 5, respectively. Conclusions are stated in Section 6.

2. Background and hypothesis

Market sentiment enhances the disposition effect and makes investors more reluctant to buy (sell) past winners (losers) during pessimistic (optimistic) periods (Antoniou, Doukas, and Subrahmanyam, 2013). Therefore, investor sentiment has a profound impact on momentum returns through its cognitive dissonance effect. In particular, past winners (losers) are expected to produce significantly higher return continuations following pessimistic (optimistic) periods compared to optimistic (pessimistic) ones. Moreover, anchoring makes investors increasingly reluctant to buy stocks that trade close to the 52-week high, especially when further good news is received and the market sentiment is pessimistic (cognitive dissonance). Investor sentiment has a greater impact on momentum returns generated using proximity to 52-week high compared to past performance (Hao et al., 2018). Although anchoring is weaker for stocks trading far from the 52-week high, the recently received bad news is likely to hinder the incorporation of further bad news into prices following optimistic periods. Near (far) stocks are expected to produce significantly higher return continuations following pessimistic (optimistic) periods compared to optimistic (pessimistic) ones.

Sorting stocks by past performance and then by proximity to 52-week high allows to investigate the interrelationship between a strong disposition effect and anchoring. Past winners that trade close to the 52-week high show strong disposition effect. Anchoring enhances the disposition effect, while market sentiment is likely to strengthen it if the recently received news disagree with the current investor sentiment (cognitive dissonance). Pessimistic (optimistic) market sentiment enhances (attenuates) the strong disposition effect of past

winners trading close to the 52-week high and leads to high (low) return continuations.[7] Past losers that trade far from the 52-week high also show strong disposition effect. Here, it is the recently received bad news that enhances the disposition effect (investors become more reluctant to sell), while market sentiment is likely to strengthen it if the recently received news disagree with the current investor sentiment (cognitive dissonance). Optimistic (pessimistic) market sentiment enhances (attenuates) the strong disposition effect of past losers trading far from the 52-week high and leads to strong return continuations (reversals).[8]

Finally, sorting stocks by proximity to 52-week high and then by past performance will provide further insights into the effect of strong anchoring and past performance on momentum returns. Stocks that trade close to the 52-week high have a strong anchoring effect. If the same stocks have also experienced good past return performance, it will produce a strong disposition effect. Pessimistic (optimistic) market sentiment enhances (attenuates) the strong disposition of these stocks, and leads to strong (weak) return continuations.[9] In particular, negative market sentiment enhances the strong disposition effect of near winners as the (past and) recently received good news disagree with the pessimistic investor sentiment (cognitive dissonance). Stocks trading far from the 52-week high and experienced poor performance in the past, also show strong disposition effect. In this case, the recently received bad news enhance the disposition effect arising from stocks that had poor past performance. Optimistic (pessimistic) market sentiment enhances (attenuates) the strong disposition effect of far losers; thus, leading to strong return continuations (reversals). The recently received bad news enhance the disposition effect, while market sentiment is likely to strengthen it if the recently received news disagree with the current investor sentiment (cognitive dissonance).[10] Overall, stocks that trade far from the 52-week high show weak anchoring but the recently received bad news make investors more (less) hesitant to sell if past return performance has also been bad (good). Recent bad news combined with bad (good) return performance in the past is likely to produce an

[7] Past winners that trade far from the 52-week high make investors weight past good news against recent bad ones. Investors are less reluctant to buy past winners that recently traded far from the reference point (no anchoring and ease of the disposition effect), and following a pessimistic (optimistic) market sentiment, it gives rise to attenuated high (low) return continuations.

[8] Similarly, past losers that trade near the 52-week high also make investors weight past bad news against recent good ones. Investors are less hesitant to sell past losers if they recently traded near the 52-week high (or recovered some losses) and following an optimistic (pessimistic) market sentiment, it gives rise to weakened return continuations (reversals).

[9] More, stocks that trade close to the 52-week high and had poor return performance make investors weight recent good news against past bad ones. Investors are less reluctant to buy stocks that recently traded close to the 52-week high and had poor past performance (poor past performance eases anchoring) and following a pessimistic (optimistic) market sentiment, it gives rise to diminished strong (weak) return continuations.

[10] Finally, stocks that trade far from the 52-week high and had good past return performance make investors weight recent bad news against past good news. Investors are less hesitant to sell stocks that recently traded far to the 52-week high and had good past performance, and following an optimistic (pessimistic) market sentiment, it gives rise to attenuated strong continuations (reversals).

enhanced (weakened) disposition effect. For more information on the 52-week high and investor sentiment effects, please see online appendix.

3. Data and methodology

Our sample consists of all stocks listed in the US market from January 1965 to December 2017, obtained from the Center of Research in Security Prices (CRSP). This includes variables such as Returns on Stock (RET), and end-of-day and end-of-month prices. All data are adjusted for dividends and splits. The first two main variables in this study are monthly and daily prices and returns. Although the end-of-month prices provide the end price for each stock, the highest price for that stock in that month is insufficient. Therefore, daily prices are also collected for all stocks in the dataset to precisely calculate their nearness to the 52-week highs by looking at the end-of-day closing price for each stock. Although this price may not be the highest price for that day, it is more accurate than the end-of-month prices. The investor sentiment data were also collected from the Baker and Wurgler dataset from 1965 to 2018 in which they formed a composite index of sentiment based on the common variation in six underlying proxies for sentiment: closed-end fund discount, NYSE share turnover, number and average first-day returns on IPOs, equity share in new issues, and dividend premiums.[11]

First, this study determined whether the overall market exhibited momentum by ranking stocks based on their past returns following Jegadeesh and Titman (1993) methodology. The momentum strategy employed an overlapping portfolio approach, meaning that at any given month t, a series of portfolios were selected in the current month and in $K-1$ months where K is the holding period. Stock returns from time t to $t+J$ were examined, where J is the observation period. For a given month $t+J$, all stocks were ranked based on their past returns. From this, ten portfolios were formed based on deciles, where the top 30% (top three deciles) was the winner portfolio and the bottom 30% (bottom three deciles) was the loser portfolio. A set of different combinations of momentum strategies were implemented where stocks were 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 and loser portfolios over time. The strategy is also applied by skipping one month after observation period before forming the portfolios, which mitigate the impact of bid and ask spreads and risk associated with portfolio formation as per the JT method.

[11] https://pages.stern.nyu.edu/~jwurgler/

Beyond exploring market momentum, this study also investigated how proximity to the 52-week high influences investors' decisions to buy or sell stocks near or distant from this statistical benchmark. George and Hwang (2004) found that the 52-week-high price accounts for a significant portion of momentum profits and the nearness to the 52-week high dominates and improves the performance of using past returns to forecast future returns. Following the George and Hwang (2004) method, the 52-week high for each stock in each month from 1965 to 2018 was first calculated. The daily price for each stock was used to generate the highest price for the stock in that specific month. Then, at any given month t, the previous 12 months were 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 were then calculated using the following formula:

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

where $P_{i,t-1}$ is the price of stock i at the end of month $t-1$, and $High_{i,t-1}$ is the highest price of stock i during the 12-month period that ends on the last day of month $t-1$. Each month stocks were ranked based on their nearness to their 52-week highs. Stocks in the top 30% were assigned to the "near" portfolio and the bottom 30% were assigned to the "far" portfolio. Typically, the 52-week strategy does not necessarily short stocks that are far from their 52-week highs. However, this study examines both 'near' and 'far' positions relative to the 52-week high, aiming to comprehend the price behavior of stocks in proximity and at a distance from this crucial reference point.

Having established that the overall market exhibits momentum and 52-week-high excess returns, we then focused on investor sentiment. Investor sentiment is not company-specific but rather time-series-based. Antoniou, Doukas, and Subrahmanyam (2013) present a unique methodology that uses a weighted moving average for investor sentiment which adjusts monthly based on the past *j* months, with greater emphasis (weight) on most recent sentiment. In any given month *t*, the weighted average sentiment index is formulated using data up to month t-j, where the weighting for the most recent month (*t*-1) is K/J, for two months prior (t-2) it is K-1/J, and for three months prior (*t*-3) it is K-2/J. Baker and Wurgler (2007) developed an investor sentiment index utilizing six distinct variables, positing it as an accurate measure of investor sentiment within the US market, with data availability spanning from 1965 to 2018.

4. Empirical results

4.1 Past return performance momentum

To determine if the overall market exhibits momentum returns, a momentum strategy was conducted by ranking stocks based on their past performance and then assigning them into deciles.[12] Table 1 shows the results for all the different strategies. All strategies had an observation period of 12 months because the 52-week strategy utilized 12 months of observations to calculate the highest price (52-week high). This ensured that the results between the momentum and 52-week highs were comparable.

[Insert Table 1]

Table 1 reports momentum returns from January 1965 to December 2018 following Jegadeesh and Titman's (1993) method. The results indicate that the market exhibits positive momentum returns during the holding periods. These results align with those of Jegadeesh and Titman (1993), who stated that momentum returns decrease as the holding period extends from 3 to 12 months. The loser (winner) portfolio yields positive returns that increase (decrease) with the holding period, leading to a decline in overall momentum returns at longer holding periods.[13]

To investigate the effect of market sentiment on future returns, Table 1 reports momentum portfolio returns for different sentiment states. A period is classified as optimistic or pessimistic when all past K months were optimistic or pessimistic. Following optimistic periods momentum returns increase markedly. In optimistic periods, holding stocks for six months results in the highest momentum return, at 1.13% monthly (equivalent to a 14.5% annual return), while a 12-month holding period yields the lowest return, at 0.75% monthly (or 9.43% annually). The loser portfolio has negative returns in all holding periods, except for the 12-month one, that decrease as the portfolio is held for longer. Following an optimistic period, investors are slow and increasingly reluctant to sell their losing stocks when further bad news arrive in the market (cognitive dissonance effect) and this results in strong return continuations. Moreover, the optimistic sentiment strengthens the disposition effect among losers, making

[12] The winner portfolio contained the top 30% stocks that have been winning in the past J months and the loser portfolio contained the bottom 30%. The mean average difference between the winner and loser portfolios over the holding period is the momentum return. Four different strategies were analyzed based on a 12-month observation period and holding periods of 3, 6, 9, and 12 months.

[13] Loser portfolio reversals are attributed to increased selling pressure during the observation period that reverses into a buying one, when investors realize that the prices are below their fundamental values, during the holding period.

investors more hesitant to trade in the hope that positive news on the overall market will minimize their losses. At longer holding periods, negative return continuations diminish as investors' expectations for company performance align more closely with the broader economic outlook. On the other hand, the winner portfolio returns are positive and increase with longer holding periods. Winners have received a series of good news in the past, and, thus, when new information accords with the current sentiment, prices reflect news rapidly. However, the winner portfolio continuation returns during an optimistic period is considerably less than its returns for the entire sample period.[14] Following an optimistic market state, investors are less reluctant to buy winning stocks when further good news is announced, leading to quick price adjustments and reduced winner portfolio return continuations. The results so far indicate that momentum returns during optimistic periods is driven by the loser rather than the winner portfolios and provide support for Hypothesis 1.

In pessimistic periods, momentum is low and negative for shorter holding periods (3/6 months) but turns to low and positive for longer periods (6/12 months). The loser portfolio yields positive reversing returns that decrease with the holding period. Investors exercise increased selling pressure on past losing stocks, during the observation period, which turns into buying one during the holding period. Further bad news coupled with pessimistic investor sentiment lead to significant mispricing of past losing stocks. The strong reversal of the loser portfolio reduces momentum returns during the pessimistic period. The winner portfolio yields high positive returns that decrease slightly with the holding period. In addition, its returns during the pessimistic period are significantly higher than those in both the optimistic and entire sample periods. The winner portfolio experienced good news over the past 12 months; however, any further good news contradict investors' pessimistic sentiment and the reflection in the stock price is delayed. This is consistent with the cognitive dissonance effect, which slows investors' reactions when news contradicts the current market sentiment. The pessimistic sentiment reinforces the disposition effect among winners and makes investors more reluctant to buy in the fear that negative news about the overall market will eliminate their capital gains.

This result indicates that investor sentiment significantly impacts momentum returns. In particular, during optimistic periods, momentum portfolios yield more than double the returns generated for the entire period, whereas in pessimistic periods, investor sentiment eliminates

[14] There is no cognitive dissonance with good news during the optimistic period. Accordingly, observable returns of the winner portfolio during the optimistic period are (up to 50%) less than those of the general winner portfolio when investor sentiment is ignored. This is due to the rapid diffusion of information and the fact that investors do not need much time to analyze or comprehend the news when it accords with the current sentiment.

momentum from the market. In the optimistic period, investors are hesitant to sell losers because it opposes current market sentiment and accordingly the loser portfolios continue to lose. This action makes the momentum strategy profitable. In pessimistic periods, the loser-portfolio returns reverse strongly, whereas the winner portfolio continuations are also strong and positive, thus, producing low (positive or negative) momentum returns. Overall, investor sentiment significantly impacts loser (winner) portfolio returns during optimistic (pessimistic) periods through the cognitive dissonance effect. Put differently, sentiment reinforces the disposition effect, which makes investors more reluctant to sell (buy) losing (winning) stocks during optimistic (pessimistic) market states.[15]

4.1.1 *Risk-adjusted momentum profits*

We examine whether or not the higher (lower) returns of the momentum (winner minus loser) portfolio during periods of optimism (pessimism) load more (less) strongly on economic risk factors by estimating the three- and five-factor adjusted momentum returns across different sentiment states. In particular, for each holding-period month, portfolio returns are regressed on the risk factors, f_i, and a constant, and thus, the risk adjusted returns are estimated as $r_{kt}^{adj} = r_{kt} - \sum_t \beta_{ik} f_{it}$, where r_{kt} represents the raw returns of each momentum portfolio for holding-period *K* and calendar month *t*, f_{it} is the realization of factor *i* in calendar month *t*, and β_{ik} is the estimated factor loading for holding period *K* on f_{it}. We observe highly positive and significant three- and five-factor risk adjusted returns for winners during both optimistic and pessimistic periods. However, momentum profits are highly significant conditioning on the three-factor model and following optimistic holding periods (up to six months). Further, past losers show negative and significant three-factor adjusted return (continuations) across all optimistic holding periods (results available upon request).

4.2 52-week high momentum

The 52-week high strategy is executed by initially calculating the proximity of all market stocks to their 52-week highs for each month t, as detailed in Equation (1). Subsequently, stocks

[15] This confirms the finding of Antoniou, Doukas and Subrahmanyam (2013) that momentum is driven by the loser portfolio during optimistic sentiment periods and by the winner portfolio during pessimistic sentiment periods. Our results show that 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.

are ranked according to this proximity, forming near (N) and far (F) portfolios. Stocks that are close to their 52-week highs yield higher returns and significantly positive alphas (George and Hwang, 2004). For instance, a stock price nearing its 52-week high suggests the recent arrival of positive news. Investors purchasing stocks close to their 52-week highs may exhibit more bias in their reactions to news, particularly if they use this metric as an anchoring reference point. Table 2 reports the results of the 52-week-high strategy.

[Insert Table 2]

To establish whether this is true for this dataset, the 52-week strategy is implemented for the entire period and then controlled for periods that are optimistic or pessimistic. Results show that the 52-week-high strategy yields positive returns in the overall market from 1965 to 2018. Holding portfolios for shorter periods (3/6 months) yields higher returns than holding them for longer (9/12 months) ones. The highest return is documented for the 6-month holding period, with a 0.56% average monthly return (6.99% annual return). Holding stocks for 12 months yield a 0.28% monthly return (3.4% annual return). The portfolio of stocks that are far from their 52-week-highs produces positive reversing returns that increase with holding period. This could be attributed to increased selling pressure of stocks that are far from their 52-week highs and possibly priced below their long-run or fundamental values. An increased demand for stocks trading at a capital loss makes the reversal more imminent. In contrast, the near portfolio return continuations decrease as the holding period increases. The disposition effect is strong if investors anchor on the 52-week high. For example, traders are more hesitant to buy stocks that are close to their 52-week highs when further good news arrive. Thus, the 52-week-high strategy generates strong near portfolio return continuations due to anchoring and, as a result, leads to higher profits compared to normal momentum investing.[16]

The results change significantly after controlling for investor sentiment. In optimistic periods, the 52-week high return is almost three times that of the entire period. When holding the portfolio for 3 months, the strategy yields 1.71% average monthly returns (22.58% annual return), while holding the strategy for 12 months yields 1.19% average monthly returns (15.29% annual return). Stocks that are far from their 52-week highs (far portfolio) yield negative returns that decrease with time. In optimistic periods, investors are slow to sell stocks

[16] The near portfolio behavior also relates to the recency effect of Bhootra and Hur (2013), in which they state that stocks that have recently reached their 52-week highs yield higher returns than stocks that have been near their 52-week highs for longer periods.

that are far from their 52-week highs due to cognitive dissonance. Although, anchoring is weaker for stocks trading far from the 52-week high, the recently received bad news is likely to hinder further bad news from incorporating into prices following optimistic periods.[17] In contrast, the near portfolio shows positive returns that increase with time. Investors are reluctant to buy near portfolio stocks if they believe that prices cannot surpass the 52-week-high reference point (disposition effect is stronger when stocks trade close to their 52-week high). In this case though, the optimistic market sentiment eases investor reluctance to buy near portfolio stocks (disposition effect attenuates), especially for short holding periods.[18] Although investors should act quickly when investor sentiment agrees with new information, anchoring holds 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 (near-far) returns are highly negative for the 3/6-month holding periods and close to zero for the 9/12-month ones. The near minus far strategy yields negative returns in pessimistic periods, which aligns with the findings of Hao, Chou, Ko, and Yang (2018). The near portfolio returns are high, positive, and change slightly across holding periods. Stocks that trade close to their 52-week highs have recently received good news; however, further good news on the same stocks contradict investors' pessimistic sentiment. The combination of cognitive dissonance and a pronounced disposition effect, induced by anchoring, accounts for the significant return continuations observed in the near portfolio during pessimistic periods.[19] On the other hand, the far portfolio generates highly positive reversing returns that decrease slightly for longer holding periods. When news accord with the current sentiment, investors act upon it in a timely manner and information diffuses quickly. Far portfolio stocks have recently received bad news, while further bad news, following a pessimistic market state, are likely to drive prices away from their long-run values

[17] In particular, further bad news about the far portfolio contradict the positive investor sentiment and investors are hesitant to act upon new information; thus, incorporation of bad news into prices is delayed. More, the optimistic sentiment reinforces the disposition effect on the far portfolio side, which makes investors reluctant to sell in the hope that positive news about the overall market will minimize their losses.

[18] Near portfolio stock investors anchor on price references; thus, making the disposition effect more pronounced. An optimistic market sentiment, is likely to alleviate investor hesitance to buy near stocks in the short run but not necessarily in the long run. This novel finding adds to the findings of Antoniou, Doukas, and Subrahmanyam (2013) that investors are reluctant to act when market sentiment is opposite to the recent stock price movement (or information arrival).

[19] For the near portfolio, news contradict 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 those in both the optimistic and overall periods. This result indicates a strong cognitive dissonance effect on stock return continuations.

to a point where a reversal is imminent. Our results confirm that the far portfolio reverses strongly during pessimistic periods.[20]

4.2.1 *Risk-adjusted 52-week high momentum profits*

We now examine whether or not the higher (lower) returns of the 52-week high momentum portfolio during periods of optimism (pessimism) load more (less) strongly on economic risk factors by estimating the three- and five-factor adjusted momentum returns across different sentiment states.[21] We find highly positive and significant three- and five-factor risk adjusted returns for the near portfolio during both optimistic and pessimistic times. The 52-week high momentum profits are highly significant and positive conditioning on the three-factor model and following optimistic holding periods. Additionally, stocks far from the 52-week high demonstrate significant negative three-factor adjusted returns (continuations) throughout all optimistic holding periods. On the other hand, the near minus far portfolio profits are highly significant and negative conditioning on the five-factor model and following pessimistic holding periods. Interestingly, far stocks show weakly significant five-factor adjusted return (reversals) across all pessimistic holding periods. In summary, stocks close to the 52-week high yield significantly positive risk-adjusted returns after both optimistic and pessimistic periods. However, stocks far from the 52-week high produce negative and significant risk adjusted returns during optimistic periods and positive and weakly significant risk adjusted returns during pessimistic periods. Investment and profitability factors explain part of the return continuation of far stocks during optimistic periods, while they offer less in terms in explaining return reversals of the same stocks during pessimistic ones (results available upon request).

4.3 Double-sort portfolio strategy

4.3.1 *Past return performance and 52-week high*

We explore the interplay among the disposition effect, anchoring, and investor sentiment by employing a double-sort strategy that accounts for past returns and proximity to the 52-week high in both optimistic and pessimistic sentiment states. In this section, stocks are ranked

[20] More, the far portfolio experiences a disposition effect (and a weak anchoring effect) that is not strong enough to prevent investors from selling the stock in the same direction with (the recently received) news and the market's pessimistic sentiment.
[21] For each holding-period month, 52-week high portfolio returns are regressed on the risk factors, f_i, and a constant, and thus, the risk adjusted returns are estimated as $r_{kt}^{adj} = r_{kt} - \sum_t \beta_{ik} f_{it}$, where r_{kt} represents the raw returns of each 52-week high momentum portfolio for holding-period *K* and calendar month *t*, f_{it} is the realization of factor *i* in calendar month t, and β_{ik} is the estimated factor loading for holding period *K* on f_{it}.

first by past return performances and then by nearness to their 52-week highs.[22] Based on their proximity to the 52-week high, past winners and losers are categorized into four groups: winners near the 52-week high, winners far from the 52-week high, losers near the 52-week high, and losers far from the 52-week high. The strategy is implemented for different holding periods and sentiment states.

The results in Table 3 show that the 52-week-high strategy within the winner portfolio yields positive returns for the different holding periods. Within the winner portfolio, returns from the near-minus-far strategy increase as the holding period lengthens. The highest (lowest) average monthly return is 0.41% (0.28%). Interestingly, sorting past winners based on their proximity to the 52-week high generates extra positive returns for the near-minus-far portfolio, which also increase with the holding period. Recall that the winner portfolio for the overall market yields positive decreasing returns as the stocks are held for longer (see Table 1). Furthermore, the magnitude of returns for the near portfolio surpasses those of the far portfolio, suggesting that anchoring and its impact on the disposition effect lead to more pronounced return continuations for stocks closer to their 52-week highs compared to those further away.[23] These findings indicate that investors' decisions are influenced not solely by past performance but also by how stocks stand in relation to their 52-week highs.

[Insert Table 3]

Implementing a 52-week-high strategy on the loser portfolio yields increasing but low returns. In shorter periods, the strategy yields negative returns that become positive as the portfolio is held for longer. The maximum return, a 0.18% average monthly return (2.23% annually), is achieved by maintaining the near-minus-far strategy for 12 months, whereas the minimum return, -0.01% monthly (-0.17% annually), occurs with a three-month holding period. Both near and far portfolios of loser stocks generate positive (reversing) returns, with the near portfolio slightly outperforming the far one, a gap that widens with longer holding periods. The loser portfolio returns for the overall market are positive and increase with the holding period (see Table 1). Moreover, the return magnitudes for both far and near portfolios

[22] Following the methodology of Jegadeesh and Titman (1993), stocks are first ranked based on their past returns and then assigned into three portfolios. The top 30% is assigned to the winner portfolio and the bottom 30% is assigned to the loser portfolio. Instead of the 10% often used in the literature, 30% was chosen to include more stocks in the portfolios as they are sorted again by their nearness to their 52-week highs.

[23] Investors exhibit a set of behavioral biases in this particular setting. Because this is a winner portfolio and stocks are sorted by their nearness to their 52-week highs, the disposition effect is reinforced by the anchoring effect. The theories suggest that both biases will prevent stocks from rapidly adjusting their prices based on the type of news. In this example, the effect is stronger in the near portfolio because the anchoring effect is strong for stock that trade close to their 52-week highs.

within the loser stocks closely mirror those of the overall loser portfolio. This result demonstrates that on the losing side, a further partition of stocks based on their proximity to their 52-week highs produces significantly low near-minus-far portfolio returns. This result indicates that investors are primarily driven by past return performance on the losing side, while the proximity of losing stocks to their 52-week highs is only marginally important.[24]

In summary, the comparison between near and far portfolios within the winner category, along with evaluating their return performance offers significant insights into the factors influencing the momentum returns of winners. First, implementing a near-minus-far strategy for the winner portfolio enhances the returns of the overall winner portfolios showcasing an annual increase of almost 5% for the 9-month holding period. On the other hand, applying a near-minus-far strategy in the loser portfolio marginally improves the returns of the overall losing portfolio demonstrating an annual increase of almost 2.23% for the 12-month holding period. This suggests that investors favoring winners consider not just past return performance but also how the stocks stand in relation to their 52-week highs. For past losers, investors are primarily interested in stocks' past performances, while proximity to the 52-week high is only weakly considered for stocks that are near their reference point. Lastly, anchoring and its impact on the disposition effect appears to be more pronounced on near portfolios of winner stocks compared to far portfolios of loser stocks.

Next, we examine whether investor sentiment affects the near and far portfolio returns of past winners or losers.[25] Table 4 shows the results for the optimistic and pessimistic periods of the winner portfolio. During optimistic periods, the near-minus-far portfolio within winners produced returns that are high and positive for holding periods up to nine months.[26] Both the near and far portfolio yield positive returns that increase as the holding period increases. However, returns are significantly higher in the near portfolio compared to the far one. More, the far portfolio returns remain relatively low compared to the near portfolio's returns for optimistic holding periods up to nine months. Stocks that are winners for the past 12 months and recently received good news (or trade close to their 52-week high) demonstrate return

[24] Stocks that have performed poorly over the past 12 months have also experienced increased selling pressure from investors during the observation period. Given that anchoring is likely to be stronger for stocks that trade near to (rather than far from) the 52-week high, we expect investors to exert buying pressure on the same stocks with some hesitance and delay during the holding period.

[25] 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 was created by assigning more weight to the most recent sentiment and less weight to past sentiments.

[26] The highest return from this strategy is observed for the 6-month holding period at 1.03% average monthly return (13.03% annually) and the lowest return is observed for the 12-month holding period at 0.63% average monthly return (7.82% annually).

continuations that are positive and significant following optimistic sentiment periods. Anchoring enhances the disposition effect but the positive market sentiment partly attenuates it and makes investors less hesitant to trade. Consequently, following an optimistic market sentiment, past winning stocks that trade close to (far from) their 52-week highs generate high (low) return continuations during the holding periods. Our results demonstrate that, during optimistic periods, investors that buy past winners pay additional attention to the position of stocks relative to their 52-week highs.[27]

[Insert Table 4]

During pessimistic periods, applying a 52-week-high near-minus-far strategy within the winner portfolio results in negative returns for shorter durations, turning positive for holding periods extending beyond 9 months. The lowest (highest) annual return is -3.13% (2.34%) and earned when holding the portfolio for 3 (12) months. The far (near) portfolio returns are positive and decrease (increase) along with the holding period. In particular, near portfolio returns are slightly lower (higher) than the far portfolio returns for the 3- (9-) and 6-(12-) month holding periods. Consequently, the near-minus-far strategy is negative (positive) for shorter (longer) holding periods in the winner portfolio. Both the far and near portfolio, within past winners, report similar returns to the overall winner portfolio during pessimistic periods. Past winners that recently received good (trade close to 52-week high) or bad (trade far from 52-week high) news show strong return continuations during pessimistic sentiment periods**.** This result is consistent with the cognitive dissonance effect where investors appear to be increasingly reluctant to buy winning stocks following pessimistic market states. Importantly, the pessimistic investor sentiment enhances return continuations of past winning stocks irrespective of the recent news received. Anchoring is producing marginal higher return continuations for past winners in the short run only (3/6 month holding periods). Finally, our results support the hypothesis that a pessimistic (optimistic) market sentiment enhances (attenuates) the strong disposition effect of past winners trading close to the 52-week high and leads to high (low) return continuations.[28]

[27] The distinction between near and far portfolios within past winners is important during optimistic periods. Investors are hesitant to buy past winning stocks that trade close to their 52-week highs (due to anchoring) and less reluctant to buy past winning stocks that trade far from this reference point. Anchoring enhances the disposition effect, while sentiment is likely to strengthen or weaken it. The double sorting, first by past winners and second by nearness to their 52-week highs, enhances return continuations of the overall past winner strategy.

[28] More, the results are consistent with the conjecture that investors are significantly less reluctant to buy past winners that recently traded far from the reference point following optimistic market sentiment (no anchoring and ease of the disposition effect).

Table 5 reports the results of implementing the 52-week high strategy for the loser portfolio in both optimistic and pessimistic periods. In the optimistic period, implementing the near-minus-far strategy on the loser portfolio yields highly positive returns. The near portfolio yields positive returns that increase with the holding period. In contrast, the far portfolio shows strong negative returns that become positive at longer holding periods. Furthermore, return continuations from the far portfolio are the primary contributors to the substantial positive returns achieved by the near-minus-far strategy. Past losers that trade far from their 52-week high show strong disposition effect. The recently received bad news enhance the disposition effect (investors become more reluctant to sell), while market sentiment strengthens this effect if the (past and) recently received news disagree with the current investor sentiment (cognitive dissonance). Moreover, our results indicate that the overall loser portfolio returns, following optimistic sentiment periods, are driven by stocks that trade far from their 52-week highs. On the other hand, past loser stocks that trade near their 52-week highs exhibit small reversals that increase in magnitude with the holding period. Put differently, investors are less reluctant to sell past losing stocks that recently traded near their 52-week high (or recovered some losses), following optimistic periods. Thus, the positive market sentiment and recently received good news make the disposition effect less pronounced and lead to attenuated return continuations.

[Insert Table 5]

Following a pessimistic period, the near-minus-far strategy in the loser portfolio produces highly negative returns that decrease for longer holding periods. The far portfolio, among loser stocks, produces highly positive and significant reversing returns that decrease with the holding period. In contrast, the near portfolio within past losers produces positive reversing returns that are persistent across the holding periods examined. Consequently, the near-minus-far portfolio exhibits sharply negative returns during the 3- and 6-month holding periods, with these negative returns becoming less pronounced in the 9- and 12-month periods. Stocks that have lost value in the past 12 months and recently traded far from their 52-week highs show strong return reversals, following pessimistic sentiment periods. Selling pressure on past losers trading significantly below their 52-week highs pushes market prices well beneath their long-term or fundamental values, particularly during pessimistic periods. An increased demand for stocks trading at a capital loss makes the reversal imminent.[29] Furthermore, the return reversals of the

[29] Investors are less (more) reluctant to sell past losing stocks when the current pessimistic sentiment agrees (disagrees) with the (past and) recently received bad news (trade far from the 52-week high). Here, the sentiment weakens the disposition effect and makes prices adjust quickly to new information.

near portfolio are smaller than the return reversals of the far portfolio following pessimistic periods. This shows that the increased selling pressure on past losing stocks was moderated by the fact that the same stocks recently traded close to their 52-week high. Proximity to the 52-week high appears to influence investor decisions to buy/sell past losing stocks following pessimistic periods.

Overall, when investor sentiment is ignored, investors focus on past return performance and react moderately on information regarding the 52-week high position. For instance, the near-minus-far strategy, within past winners, generates low and positive returns. When optimistic and pessimistic investor sentiment is considered, the results change significantly. During an optimistic period, the near-minus-far portfolio generates highly positive returns for both past winners and losers. These findings are attributed to the weak (strong) return continuations of the far portfolio among winners (losers). Therefore, following optimistic periods, investors pay significant attention to the stocks' 52-week-high positions in addition to past return performance. Following pessimistic periods, the near-minus-far portfolio generates low negative or positive returns for past winners. However, among past losers, the near-minus-far portfolio generates highly negative returns due to the strong reversal of stocks trading far from their 52-week high. In summary, sentiment and anchoring influence significantly investors' decisions to buy/sell past winners and losers. Trading near or far from the 52-week high enhances the disposition effect, while market sentiment strengthen (attenuate) it if the recently received news disagree (agree) with the current investor sentiment. These findings are in accordance with the findings of Hao, Chou, Ko, and Yang (2018) that the 52-week high is a better predictor of future returns. Interestingly, the findings indicate that the 52-week high exerts a more substantial impact during optimistic periods than in pessimistic ones.

4.3.2 *52-week high and past return performance*

In each specified month, stocks are ranked by their proximity to the 52-week high, forming near and far portfolios.[30] Subsequently, stocks within the near and far portfolios are categorized as past winners or losers, based on their historical performance. The results, reported in Table 6, show that implementing a momentum strategy for the near portfolio yields positive returns that decrease as the holding period increases. The winners and losers in the near portfolio show

[30] Stocks in the top 30% are assigned to the "near" portfolio and stocks in the bottom 30% are assigned to the "far" portfolio. Thereafter, stocks in these portfolios are ranked based on their past 12 month returns performance. Stocks with top 30% highest returns are assigned to the winner portfolio and those in the bottom 30% are assigned to the loser portfolio.

positive returns; however, the winner (loser) returns decrease (increase) with the holding period. For investors that anchor on the stocks' proximity to their 52-week high, a further partition into past winners and losers produces positive momentum returns, especially for the shorter holding periods. Should investors anchor on the stocks' proximity to their 52-week highs, a delayed price adjustment to subsequent good news and robust return continuations are anticipated (anchoring effect). If the same stocks have experienced capital gains in the past, investors are increasingly reluctant to buy when news arrive in the market. Winner stocks in the near portfolio produce higher positive return continuations than the loser stocks in the same portfolio. This suggests that investors anchoring on prices near their 52-week highs (recent good news) exhibit more reluctance to purchase stocks with capital gains (winners) than those with capital losses (losers) in the preceding 12 months. Consequently, the disposition effect is weaker for past losers compared to winners in the near portfolio. Overall, anchoring to the 52-week highs leads to notably higher return continuations for past winners as opposed to past losers, accompanied by a diminishing positive momentum return over extended holding periods.

In the far portfolio, winner (loser) stocks yield positive returns that decrease (increase) with the holding period. For this reason, the difference between the winner and loser returns decreases as the stocks are held for longer. For example, the 3-month holding period yields an average monthly momentum return of 0.15% (1.81% annual), whereas the 12-month holding period yields an average monthly momentum return of -0.13% (-1.55%). If investors anchor on the stocks' proximity to the 52-week highs, then the anchoring effect is much weaker for stocks that trade far from it and price adjustment to new information is less biased by the reference point. Winner stocks in the far portfolio produce slightly higher (lower) positive returns than the loser stocks in the same portfolio for holding periods of 3 (9) and 6 (12) months. As a result, investors earn no significant momentum return by sorting far stocks into past winners and losers. Far portfolio losing stocks have experienced recent and past selling pressure during the observation period which slowly turns into a buying one as investors are reluctant to sell due to the enhanced disposition effect.[31] Our results demonstrate that return performance over the past 12 months is significantly more important for stocks that trade near rather than far from their 52-week high.

[31] On the other hand, far portfolio winners have experienced recent selling and past buying pressure during the observation period. Investors are less reluctant to buy during the holding period due to weak anchoring but their decision to do so depends in weighting the size of recent bad news against the size of the past winning performance.

[Insert Table 6]

Next, the double-sort strategy is applied, and portfolio returns are reported following optimistic and pessimistic periods. The results for the near portfolio returns are shown in Table 7. In an optimistic period, implementing a momentum (winner minus loser) strategy for the near portfolio yields low positive (negative) returns in short (long) holding periods. This occurs as returns from the loser portfolio grow over time, while returns from the winner portfolio remain relatively unchanged across different holding periods. Remarkably, both winner and loser stocks within the near portfolio generate positive returns nearly equivalent to the aggregate returns of the near portfolio during optimistic periods.

[Insert Table 7]

Near stocks trade close to their 52-week highs or have recently received good news. If investors anchor on the stocks' proximity to their 52-week highs, slow adjustment of prices to further good news and strong return continuations are expected. This effect is more pronounced when the overall market sentiment contrasts the recently received good news (cognitive dissonance). Winner stocks in the near portfolio produce slightly higher positive return than loser stocks in the same portfolio. A favorable market sentiment generates similarly sized positive continuing returns for both past winners and losers in the near portfolio. Trading close to the 52-week high enhances the disposition effect; however, a positive market sentiment appears to partly attenuate it. Following optimistic periods, investors are less hesitant to purchase stocks priced near their 52-week highs, irrespective of their past performance as winners or losers. Importantly, investors who primarily focus on the stocks' price position relative to their 52-week high gain a small positive (or negative) momentum return by sorting stocks into past winners and losers during optimistic periods.

After a pessimistic period, applying a momentum (winner versus loser) strategy to stocks near their 52-week highs results in substantially positive returns. Specifically, the momentum strategy produces returns that are nearly fourfold higher during a pessimistic period compared to an optimistic period. These higher returns can be attributed to the significantly high positive returns of the winner portfolio. Even though the loser portfolio yields positive returns, the magnitude of winner returns dominates, resulting in highly positive momentum performance. 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). Analyzing both winner and loser returns in the near

portfolio during pessimistic states provides a better understanding of investor behavior. The loser (winners) stocks in the near portfolio yield positive returns that slightly increase (decrease) with the holding period. After pessimistic periods, investors anchoring on stocks trading near their 52-week highs show a growing reluctance to purchase stocks with past gains over losses.

Negative market sentiment, conflicting with both past and recent positive news, leads to significantly higher positive returns for previous winners over losers, indicating strong cognitive dissonance for stocks near their highs.[32] Investors engaging with stocks near their highs, particularly winners, encounter an intensified disposition effect post-pessimistic sentiment, explaining the observed robust return continuations. In other words, during pessimistic periods, investors are increasingly hesitant to buy stocks that the market is currently pricing close to their 52-week highs and had a long record of positive returns. Therefore, investors who primarily focus on the stocks' positions relative to their 52-week highs gain large positive momentum returns if they further sort these stocks into past winners and losers following pessimistic periods.

Moreover, the behavior of winner and loser stocks in the far (from 52-week high) portfolio during both optimistic and pessimistic periods is examined.[33] The optimistic period is considered first**.** Table 8 demonstrates that implementing a momentum strategy on stocks distant from their 52-week highs produces significant positive returns for 3- and 6-month periods, but these returns diminish for 9- and 12-month intervals. For example, the average monthly momentum returns for the 3-month holding period are 0.8% (10.03% annually). However, this decreases to 0.09% average monthly (1.09% annually) in the 12-month holding period. The high positive momentum returns are driven by the high return continuations of losers compared to winners. In the far portfolio, loser stocks yield significantly lower returns than their winner counterparts, and for both groups, returns decline over the holding period. Positive market sentiment, conflicting with recent negative news and past underperformance,

[32] Cognitive dissonance is weaker for near portfolio losers as the negative sentiment accords (disagrees) with the past (recent) bad (good) performance. Investors seem to weight the recently received good news against the poor past return performance, and in a pessimistic state, further good news are likely to face less buying resistance.

[33] Considering the behavior of winners and losers in the far portfolio, implementing a momentum strategy on stocks that are far from their 52-week highs will yield negative returns in longer holding periods and positive returns in shorter holding periods. This is because the loser portfolio returns increase as the holding period increases and the winner portfolio returns decrease when they are held for longer periods. Thus, the momentum returns start out as low positive returns but become low negative returns if held for longer periods. This result indicates that investors who have anchored their stock prices far from their 52-week highs are not overly concerned about the same stocks being past winners or losers.

induces a pronounced cognitive dissonance effect among losers in the far portfolio.[34] For far portfolio winners, the cognitive dissonance effect is weaker as the positive market sentiment accords with the past return performance. During optimistic states, investors are less hesitant to sell stocks that recently traded far from the 52-week high and had good past performance, thus, giving rise to diminished return continuations. Following an optimistic market sentiment, investors who primarily focus on the stocks' price position relative to their 52-week highs gain a large positive momentum return if they further sort these stocks into past winners and losers and hold the portfolio for up to six months.

Employing a momentum strategy during a pessimistic period for stocks that are far from their 52-week highs yields negative returns that decrease at longer holding periods. Holding the momentum portfolio for 3 months yields average monthly momentum returns of -0.37% (-4.35% annually), whereas holding the same portfolio for 12 months yields average monthly returns of -0.12% (-1.43% annually). Winners and losers in the far portfolio exhibit large return reversals that decrease with the holding period; however, the loser portfolio return reversals exceed the winner portfolio reversals. Recent and past poor return performance demonstrate increased selling pressure during the observation period, prices that drift below fundamental values followed by strong return reversals during pessimistic periods. Results show that, following periods of negative market sentiment, investors are less hesitant to sell far stocks that also experienced losses over the past 12 months.

[Insert Table 8]

Overall, stocks trading far from their 52-week high exhibit weak anchoring, yet recently received bad news makes investors more (less) hesitant to sell if their past return performance has been poor (strong). Recent bad news, combined with poor (strong) past return performance, produces a stronger (weakened) disposition effect. However, the negative market sentiment attenuates the disposition effect and makes investors sell their far losing stocks more imminently, and thus, driving prices way below fundamentals where a strong reversal is necessary. Consequently, following pessimistic periods, investors who consider stocks that trade far from their 52-week highs will incur a negative momentum return if they further sort these stocks into past winners and losers.

[34] This also shows that, following optimistic periods, investors are increasingly reluctant to sell stocks that trade far from their 52-week highs and have experienced losses in the past 12 months. Recall also that stocks trading far from the 52-week high and experienced poor performance in the past, show strong disposition effect.

In summary, sorting stocks by closeness to their 52-week-highs and then by past performance yields significantly higher positive returns for the near portfolio compared to the far one. For stocks that are near their 52-week highs, momentum is consistently positive. However, for stocks that trade far from their 52-week highs, momentum returns become negative as stocks are held for longer periods. Moreover, during optimistic periods, momentum returns are significantly higher and positive for the far portfolio compared to the near portfolio. This result is attributed to the strong return continuation of losers in the far portfolio and the pronounced cognitive dissonance effect (bad news contradicts the positive investor sentiment). In addition, during pessimistic periods, stocks close to their 52-week highs exhibit positive momentum returns, in contrast to stocks distant from their 52-week highs, which display negative momentum returns. This result is due to the strong return continuation of winners in the near portfolio and the pronounced cognitive dissonance effect (good news contradicts the pessimistic investor sentiment). Overall, our findings demonstrate that investors who primarily focus on the stocks' price positions relative to their 52-week highs gain a positive momentum return from winners in pessimistic periods and from losers in optimistic periods. This result aligns with the cognitive dissonance effect of Antoniou, Doukas, and Subrahmanyam (2013) and provides further insights on the interrelationship between sentiment, anchoring and the disposition effect.

5. Robustness check

5.1 Fama–Macbeth regression

To investigate further the profitability of various momentum strategies, a Fama–Macbeth regression on the 52-week-high and JT strategies is conducted. The Fama–MacBeth cross-sectional regressions (Fama and MacBeth, 1973) 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 return to stock i in month t, $R_{i,t}$. The explanatory variables are dummies that indicate whether stock i is held in month t as part of the JT or 52-week-high strategies. The coefficients for the dummies allow us to examine and isolate the returns based on a single strategy. Table 9 reports the regression results. The coefficients of the 52-week-high momentum dummies dominate those of the JT momentum strategy across most holding periods (except the three-month period). For example, holding a self-financing 52-week-high momentum portfolio for six months yields 0.42% per month, which is much greater than the

0.29% per month earned by the JT momentum portfolio. The coefficients on past winners are positive and significant only for the 3- and 6-month holding periods, whereas the coefficients on the stocks near the 52-week highs are positive and significant across all holding periods. Moreover, stocks that are far from the 52-week highs yield negative and significant returns across all holding periods, indicating that far stocks contribute positively to the near-minus-far strategy. The near portfolio shows a slight increase in returns as the holding period extends to 12 months. Returns for the winner portfolio in the JT strategy decrease as the holding period increases, which is consistent with the previous result. In addition, returns for the loser portfolio decrease as the holding period is extended. Regarding the control variables, the size effect is negative and significant across the different holding periods, which indicates that stocks with large market caps yield lower returns. Similarly, the significant negative coefficients of past returns confirm the bid-ask bounce effect.

[Insert Table 9]

These results could be influenced by exposure to risk factors such as market, size, or value. Therefore, the cross-sectional regression is repeated on risk-adjusted returns using Fama and French's (1993) three-factor model and then regressed again cross-sectionally. The results reported in Table 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 depend on excessive risk taken, or on the market, size, or value factors. It is noteworthy that past losers show significant and negative returns across all periods, yet these are still smaller compared to the far portfolio (holding period) returns. Finally, the same regression analysis is conducted with a one-month gap between the observation and holding periods (Panel B).

[Insert Table 10]

5.2 Fama–Macbeth regression and investor sentiment

To establish the robustness of the results during various sentiment periods, the monthly coefficients from the previous Fama–Macbeth regression in Table 8 are analyzed for the different sentiment states. The results are reported in Table 11 and skip a month between the observation and holding periods. The findings indicate that the 52-week-high momentum strategy outperforms the JT momentum strategy during optimistic sentiment periods and in all holding periods classified as optimistic. Far portfolios yield negative and significant returns across all holding periods classified as optimistic, aligning with the cognitive dissonance effect.

However, neither past winners nor the near portfolio generate positive returns during pessimistic periods, indicating a significantly lesser effect of investor sentiment on stocks that have recently received positive news. Returns not skipping a month are not reported here; however, they are available upon request.

The disparity in returns of the 52-week-high strategy between optimistic and pessimistic sentiment periods significantly surpasses that of the momentum strategy returns in identical sentiment periods. Most results show statistical significance for the 52-week-high strategy, in contrast to the momentum strategy returns. These results align with the results of Hao et al. (2018).

[Insert Table 11]

5.3 Bid-ask spread risk

To mitigate the risk of the bid-ask spread when forming a portfolio, momentum strategies based on past performance and proximity to the 52-week high skip one-month between the observation and holding periods (see Table 12). This robustness check not only strengthens the results but also mitigates any risks associated in portfolio creation. Our findings, as reported in Table 1, reveal high momentum profits during optimistic periods, attributed to the sustained returns of past losers and the cognitive dissonance effect following positive market sentiment. Although skipping a month slightly alters the returns of past losers and winners during the holding period, it renders the momentum profit more robust, being positive during optimistic periods and negative during pessimistic ones. This indicates that the results for the momentum strategy are fairly robust to the bid-ask spread.

[Insert Table 12]

The same analysis is conducted for the 52-week strategy across optimistic/pessimistic states (results available upon request). Similar to Table 2, the results show that skipping a month after the observation period only marginally changes near/far portfolio returns, while the 52-week high momentum returns is even stronger across optimistic periods. This demonstrates increased robustness and reaffirms the findings of the previous analysis. Moreover, double-sort strategies accounting for bid-ask spread risk show that momentum returns are largely unaffected or even higher during optimistic periods, indicating that the initial findings, as reported in Tables 3 and 4, are robust. Results are available upon request.

5.4 Persistence of momentum profits

Utilizing the methodology of George and Hwang (2004) and Hao, Chou, Ko, and Yang (2018), we conduct a persistence analysis to assess the future performance of the 52-week-high and JT momentum strategies in terms of return continuations and reversals after the first year. Table 13 reports the persistence results. Analysis is similar to that shown in Table 9; however, we allow for a time gap of one to four years in the holding period so that returns are measured across years two to five. For example, Raw return (14,25) means that we observe return performance over the past 12 months, skip a month between observation and holding period, while the portfolio's performance reported is from month 14 to month 25 (essentially the return over the second year).

[Insert Table 13]

Table 13 shows the returns of the different strategies from the second to the fifth year after portfolio formation. Similar to the results of Hao, Chou, Ko, and Yang (2018) and George and Hwang (2004), the momentum strategy shows reversals from the second to the fifth years but only years two and five show negative and significant returns. 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 negative returns for all single years from the second to the fifth, none of the reversals are statistically significant. Moreover, there is no evidence of significant reversals for the stocks that are either near or far from their 52-week highs.

Persistence analysis of momentum and 52-week-high profits during different sentiment periods is also conducted and results are reported in Table 14. Past losers (winners) show significant and positive (negative) returns across all pessimistic (optimistic) periods beyond year one; however, a momentum strategy generates significant and negative returns only during pessimistic periods. For the 52-week-high strategy, near portfolio returns are significant and positive (negative) during optimistic (pessimistic) periods in years two and five only. Notably, both the far portfolio and the 52-week high momentum strategy fail to produce significant returns beyond the first year. Contrary to Hao et al. (2018), who found that momentum profits exhibit reversals in high sentiment periods, these results indicate that momentum reversals occur exclusively during low sentiment or pessimistic periods.[35] The results here indicate that returns predicted by the 52-week high strategy will not persist after year one. Moreover, the findings suggest that traders correct the initial bias induced by anchoring within a year after

[35] The time period used may explain this difference to some extent because these authors used data from 1965 to 2010, whereas the time period in this case extends to the end of 2018.

portfolio formation. Finally, the persistence analysis reveals that past winners (losers) reverse despite the optimistic (pessimistic) sentiment after year one, which indicates that the bias induced from extrapolating past performance into the future is corrected in subsequent years. While sentiment amplifies return continuations and reversals during the holding period, anchoring may prevent investors from driving stock prices significantly above (or below) fundamentals, necessitating a correction in subsequent years.

[Insert Table 14]

6. Conclusion

This study investigates portfolio holding returns of US stocks sorted by past performance and proximity to their 52-week highs under optimistic/pessimistic sentiment states. Our aim is to better understand the interrelationship between behavioral biases, such as the disposition effect and anchoring, and their modulation by market sentiment. While studies indicate that these behavioral biases can individually explain or predict future returns, their collective impact on stock returns remains less understood.[36] Initially, a single-sort strategy was employed, based either on past return performance or the stock's proximity to its 52-week high. The results underscore a significant link between past performance and market sentiment, as well as between proximity to the 52-week high and market sentiment. Subsequently, a double-sort strategy was applied, where stocks were first ranked by past return performance and then by their nearness to the 52-week high, and vice versa. The double-sort portfolio results reveal that anchoring amplifies the disposition effect, whereas investor sentiment can either strengthen or weaken this effect, depending on whether recently received news aligns or conflicts with the prevailing market sentiment. The portfolio investment strategies were applied to all US stocks from 1960 to 2018.

The results indicate that investor sentiment significantly impacts momentum returns. Following an optimistic period, momentum returns are significantly higher and positive compared to a pessimistic period. The high momentum returns during an optimistic period are attributed to the loser portfolio return continuations, whereas during the pessimistic period, winners and losers produce very high return continuations and reversals, respectively. Furthermore, momentum profits significantly decrease in periods of pessimistic investor sentiment. This result is consistent with Antoniou, Doukas, and Subrahmanyam (2013) who show that momentum is driven by the loser portfolio during optimistic sentiment periods and by the winner portfolio during pessimistic sentiment periods. Investor sentiment has also a great impact on the 52-week-high momentum strategy. Following an optimistic period, the 52-week-high momentum portfolio yields significantly higher positive returns than following a pessimistic period. The substantial 52-week-high momentum returns, during an optimistic

[36] Several behavioral biases affect future returns by either slowing or increasing the pace of information diffusion in this analysis. These are the disposition effect (Grinblatt and Han, 2005; Birru, 2015), cognitive dissonance, and anchoring (George and Hwang, 2004; Baker and Wurgler, 2006; Stambaugh et al., 2012; Antoniou, Doukas, and Subrahmanyam 2013; DeVault et al., 2019). These behavioral biases have been studied in isolation; however, research that assess them combined is limited. This appears to be the case when the future returns of winner and loser stocks are examined while controlling for their positions relative to their 52-week highs during optimistic and pessimistic periods.

period, are attributed to the far portfolio return continuations, whereas during the pessimistic period, near and far stocks generate significantly high return continuations and reversals, respectively. In periods of pessimistic investor sentiment, the 52-week-high momentum portfolio results in notably negative returns for shorter holding periods. These findings demonstrate that momentum returns, based on past performance or proximity to the 52-week high, are markedly influenced by investor sentiment, consistently showing higher returns following optimistic periods compared to pessimistic ones. Sorting stocks by their proximity to the 52-week high amplifies momentum returns, corroborating George and Hwang's (2004) findings.

The double-sort portfolio strategy ranks stocks, first, by past returns and then, by nearness to the 52-week high, and vice versa. Employing a 52-week high (near minus far) strategy within past winners or losers results in low portfolio returns. Following an optimistic market sentiment, a near minus far strategy produces highly positive and significant returns for past winners (losers) due to strong return continuations of near (far) stocks. Trading close to the 52-week high (anchoring) enhances the disposition effect of past winners; however, this effect is partially mitigated by positive market sentiment. On the other hand, the recently received bad news of far stocks strengthen the disposition effect of past losers, while the optimistic market sentiment disagrees with the (past and) recently received bad news creating a strong cognitive dissonance effect. After a pessimistic period, a near-minus-far strategy leads to modestly positive or negative returns for past winners and significantly negative returns for past losers over 3 to 6-month holding periods. Past winners produce significantly positive return continuations regardless of the stocks' proximity to the 52-week highs during periods of negative market sentiment. In other words, investors are increasingly reluctant to buy past winners following a pessimistic sentiment (cognitive dissonance), while nearness to the 52-week high seems to make no difference on the returns generated by winning near or far stocks. Concerning past losers, far stocks exhibit significantly greater reversals compared to near stocks over holding periods of 3 to 6 months.[37] After pessimistic periods, the impact of losing stocks' proximity to their 52-week highs is evident only in holding periods of up to six months.

[37] The selling pressure on past losing stocks that also trade far from their 52-week high will push market prices way below their long-run (or fundamental values), especially following pessimistic sentiment states. An increased demand for stocks trading at a capital loss makes the reversal imminent. However, the increased past selling pressure was partly moderated by the recently received good news of near stocks. Also, having traded recently close to the 52-week high has covered some of the past losses and this makes investors less hesitant to trade on further news.

These results are in line with Hao, Chou, Ko, and Yang (2018), suggesting the 52-week high as a superior predictor of future returns, yet our findings specify this predominantly occurs in optimistic periods.

A momentum strategy, when initially controlled for proximity to the 52-week high, yields significantly higher and positive returns for the near portfolio compared to the far one. In the wake of optimistic (pessimistic) sentiment, a winner minus loser strategy generates positive and significant returns for the far (near) portfolio attributed to strong return continuations of past losers (winners). Past performance strengthens the cognitive dissonance effect arising from stocks trading close to (far from) the 52-week during pessimistic (optimistic) periods.[38] Interestingly, a momentum strategy yields no significant returns for the near portfolio under optimism and the far portfolio under pessimism. Overall, the results show that investors who primarily focus on the stocks' positions relative to their 52-week highs produce a positive momentum return from winners in pessimistic periods and losers in optimistic periods. These results are consistent with those of Antoniou, Doukas, and Subrahmanyam (2013) and provide further insights on the interrelationship between sentiment, anchoring and the disposition effect. Finally, a novel contribution of this study is that anchoring enhances the disposition effect, while investor sentiment can either attenuate or enhance it further depending on whether current sentiment accords or contradicts with the (past and) recently received news, respectively. This study improves the understanding of momentum returns, anchoring, and the role of investor sentiment in terms of predicting future return continuations or reversals.[39]

The Fama–MacBeth cross-sectional regression results allow for a simultaneous comparison of the two strategies while controlling for firm size and bid-ask spread effects. The results show that the dominance of the 52-week-high strategy is even stronger in risk-adjusted returns than in raw returns. For instance, a self-financed 52-week-high momentum portfolio held for six months generates a monthly return of 0.429%, significantly outperforming the 0.296% monthly return of the JT momentum portfolio. Stocks that trade far from the 52-week highs yield significant negative returns across all holding periods indicating that the same

[38] The strong return continuation of losers (winners) in the far (near) portfolio are attributed to the pronounced cognitive dissonance effect, where past and recent bad (good) news contradict the positive (negative) investor sentiment.

[39] Stocks that trade close to the 52-week high (strong anchoring effect) and have experienced capital gains in the past show a strong disposition effect. A pessimistic market sentiment contradicts the recently (and past) received good news and leads to high return continuations. Similarly, stocks that trade far from the 52-week high (received bad news recently) and have experienced capital losses in the past show a strong disposition effect. An optimistic market sentiment contradicts the recently (and past) received bad news and leads to high return continuations alike.

stocks are due for more negative news regardless of having 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 reveals significant reversals in momentum returns during the second and fifth years. In contrast, there is no evidence of significant reversals on any of the years examined for the 52-week-high (near minus far) portfolio. One of the practical implications of this study is that testing multiple variables simultaneously can produce significant results that pave the way for more research and ultimately find the variables that affect momentum the most.

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