Momentum investing: past return method compared to the 52-week high nearness method

Dennis van der Staak *372681* *Erasmus University Rotterdam*

Abstract:

In the entire sample of 1926 to 2015 the returns of momentum investing based on past returns is lower than reported in the paper by Jegadeesh & Titman (1993). Although smaller, the abnormal return based on the 3 factor model of Fama & French of the Jegadeesh & Titman method is more prominent than the 52-week high nearness method. Although the nearness method and the past return method of Jegadeesh & Titman are partly similar, this research finds evidence that the 52-week high nearness method is more different than assumed by George & Hwang (2004). In the entire sample the methods partly dominate each other but there is still a large portion left unexplained in each of the methods. The difference in volatility across months between the J&T method and the nearness method is also reason to believe that the two methods are partly separate effects.

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I. Introduction

The momentum strategy is one of the most wide-known market anomaly in finance. It was first observed by Jegadeesh & Titman (1993) who found an average outperformance of 1.2% per month based on past returns. In 2004 a similar approach caught attention as the so called 'nearness to the 52-week high price' could explain and improve upon the momentum effect of past return as measured by Jegadeesh & Titman (George & Hwang, 2004).

In this thesis I will compare the 52-week- high nearness method of George & Hwang with the past return method of Jegadeesh & Titman(1993). The research question is:

Are the George & Hwang method of 52-week-high nearness and the Jegadeesh & Titman method of past returns the same momentum investing strategies?

In order to answer the research question I will first observe the momentum effect of the J&T method and the nearness effect separately by calculating both raw returns and abnormal returns based on a buy and sell portfolio which are calculated using 10 deciles (tables II -VII). To check if the two methods overlap in terms of return I use double sorting. The double sorting is based on 5 quintiles of both the J&T method as the nearness method. This results in 2 tables for raw returns which 25 quintiles each (sorting for nearness returns when correcting for J&T quintiles and vice versa, table VIII and IX). This method is repeated for the risk adjusted returns of the CAPM and the Fama & French models (tables X-XIII). After that the volatility in months is compared for the J&T method and the nearness method by taking abnormal return (based on the Fama & French 3 factor model) of the 1^{st} minus the 10^{th} decile.

The results of the J&T method are smaller than one would expect based on the original paper by Jegadeesh & Titman (1993). For the strategy of 9 months framing and 6 months holding the return is equal to 0.57%(table II) compared to 1.2% found by Jegadeesh & Titman. Over the entire sample of the CRSP database (1926 to 2015) the momentum effect decreased compared to the period used by Jegadeesh & Titman (1965-1989). Surprisingly, the raw results of the nearness method is negative. When looking at the abnormal return for both the CAPM model and Fama & French 3 factor model the momentum effect of J&T is more prominent. The 3 factor alpha for the J&T method is 0.66%(table V) and the alpha for nearness is 0.53% (table VII).

When controlling for nearness quintiles, the average J&T return is 0.26% (table XIII) compared to 0.66% (table V) this is much lower. The same happens when comparing the nearness results when controlling for J&T quintiles. The return of 0.29% (Table XI) is lower than the return of 0.53% (table VII). Although the methods partially dominate each other, the methods still hold significant positive returns when correcting for the other momentum method. This means that, although the methods are similar, they are not the same. When the volatilities are compared (figure I) the idea that the two momentum investment methods are similar but not the same is encouraged. The volatility of the two methods differ a lot. The J&T method is prominent during February to July but the returns are relatively low during December and even negative in January. The nearness method is much more stable and peaks at July and November to January.

In contrast to previous research, this paper focuses on the entire period available in the CRSP database. It compares the J&T method with the nearness method in the period of 1926 to 2015. Using portfolio sorting based on both methods as well as double sorting this research focuses on the differences between the two momentum investing methods. Looking at the volatility across month this research adds to the likeliness that the two methods are more different than previously thought.

II. Literature

The momentum effect is a popular research topic. The momentum effect, first observed in 1993, is an empirically observed trend for stocks that performed well in the past to keep outperforming the stock market and stocks that performed poorly to underperform compared to the market. Research on the momentum effect show that this investment opportunity can achieve an outperformance of 12.01% on yearly basis(ignoring transaction costs) (Jagadeesh & Titman, 1993). The method used in this paper is based on the stock prices in the period 1965 to 1989 based on NYSE and AMEX index stocks. Later research, based on the same data in the years 1990 to 1998, suggest that the results found in 1993 were not the result of "data snooping bias" as the momentum effect continued to occur in the sample period (Jegadeesh & Titman, 2001). This paper also comes up with a possible reason for the momentum effect. According to this paper. The momentum effect is caused by "a delayed overreaction". Investors do not directly know how to interpret the news. The fact that the news takes a while to be included in the price is reason for investors to believe that the price will keep rising. When the market figures out that the price too high the momentum effect is reversed, causing lower returns. When the holding portfolios are held for a longer period it is observed that winners become losers and losers become winners again. This phenomenon, also known as the reversed momentum effect, suggest that the momentum effect is "due to delayed overreactions that are eventually reversed". One might argue that the momentum effect is caused by irrational agents that influence prices on the stock market. Although this may seem like an easy solution to the existence of the momentum effect research suggests that this effect may even occur with fully rational agents in efficient markets (Crombez, 2010). Other research suggest that the momentum effect in the short run and the reversed momentum effect in the long run are two separate effects. "The 52-week-high price can explain a large portion of the profits from momentum investing" (George & Hwang, 2004). In this paper the 52-week-high price is believed to be used as an anchor by investors. Investors use the 52-week-high price to valuate good and bad news about a company. This leads to under reaction to the available news which is later corrected causing the momentum effect. This paper has some implications for the reason of the momentum effect. If the momentum effect and the reversed momentum effect are two separate effects the momentum effect cannot be caused by delayed overreaction. The reason of the momentum effect might just be the cautious investor that has a hard to interpret the news. This investor will see good news as a favorable event that will

bring the stock price closer to the 52-week high price. This anchoring effect may be part of the causation of the momentum effect. Although the 52-week high price is historical information that should have no effect on future stock prices research has shown that the 52-week high price is more than just a historical price. 52-week high related investment strategies outperform the market corrected for the effect of the momentum strategy. (Liu, Liu, & Ma, 2011).

As said, the first paper that brought attention to the momentum strategy is the paper by Jegadeesh & Titman (1993). The results found in the paper are determined by a certain holding period (K) and are observed using lagged return for an observing period (J). different holding periods and observing periods are used to compute the monthly return of buying winners and selling losers. The most profitable period to frame the past return and hold the portfolio seems to be the 9 months framing and 6 months holding combination. In this paper this combination of framing and holding leads to a return of 1.2% per month. After this, the paper describes several effects such as the seasonal effects on the momentum returns and the differences in winners and losers. The results found in the paper are supported by another paper from the same authors, Jegadeesh & Titman (2001). This paper focuses more on possible reasons for the momentum effect that are supposedly caused by behavioral aspects.

The 52-week high adds likeliness of involvement of behavioral aspects as reason of the momentum effect. “Readily available information - the 52-week high price- explains a large portion of the profits from momentum investing”. The 52 week high is supposedly used as a anchor to frame news events and is used as a pricing mechanism. This anchoring as behavioral aspect adds to the momentum theory as it is more profitable when January is excluded and, in contrast to momentum investing, the 52-week high momentum investing isn’t reversed in the long run (George & Hwang, 2004). The 52-week high momentum investing is based on the ”nearness of a stock’s price to its 52-week high”. The stocks with the highest nearness to the 52-week high are seen as winners and the stocks with the lowest nearness are seen as losers. The paper is based on the period of July 1963 to December 2001. This period is rather short to effectively compare the 52-week-high price method with the J&T past return method.

III. Data

The method of collection and adjusting the data needed for this thesis is discussed in this chapter.

The same method of data collection is used as the paper of Jegadeesh & Titman(1993). The CRSP monthly database is used to achieve data of stock returns in the period of January 1925 to December 2015. From this database only shares with a share code of 10 and 11 are used because using this category excludes all non-share securities. Only stocks with an exchange code of 1 or 2 are used so that only stocks of the NYSE are included.

For the 52-week-high nearness method the CRSP daily database is used, containing the same stocks as the monthly variant of this database. From the daily data the highest closing price of every day is used to determine the 52-week-high price. This price data is then merged with the monthly return file to create one main database including: past returns, 52-week-high prices, current prices, and current returns. Only stocks with information available for at least 12 months are used in order to use an accurate 52-week-high price. Because the 52-week-high method needs to be compared to the past return method of Jegadeesh & Titman(1993) this criteria is also used for the past return method.

In order to correct for the Fama French factors (3 factor model) and the market beta, the monthly 3 factor file of Dartmouth is used. This file is merged with the final file of monthly returns with an available 52-week-high price. Using this method the returns can be corrected for risk associated with the market movement, size of the firm and market to book ratio of each firm.

Table I

Summary statistics of the data in different periods.

The period 1965 to 1989 is added because this is the original sample used in the paper of Jegadeesh & Titman (1993). The entire database contains a total of 8640 companies and 1,592,414 monthly observations.

Period	Average Monthly Return	Std. Dev.	Nearness	Std. Dev.	Observations
1926-1950	0.01549	0.1728	0.7415	0.2128	210,692
1951-1975	0.00940	0.1162	0.7713	0.1869	469,784
1976-2000	0.01489	0.1401	0.7699	0.1919	610,952
2001-2015	0.01079	0.1562	0.7719	0.2140	300,986
1926-2015	0.01258	0.1417	0.7669	0.1979	1,592,414
1965-1989	0.01338	0.1293	0.7587	0.1885	626,165

IV. Methodology

The sorting of the data to compare the Jegadeesh & Titman past return method with the 52-week-high nearness method of the data described in chapter 3 is sorted to achieve returns for each portfolio. This method is described in this chapter.

For the Jegadeesh & Titman method different framing periods and holding periods are used. The data described in chapter 3 is first sorted in 10 deciles based on past returns for a framing period of 3,6,9 and 12 months. This creates 4 different databases with monthly stock returns sorted based on the past returns. All these databases are then observed using a holding period of 3,6,9 and 12 months. The data is then collapsed resulting on one observation per decile per month based on the average of all the stock returns in this decile that specific month .This is done to correct for periods where more stocks were available. This results in raw results of the J&T method shown in table II. For a framing period of 9 months and a holding period of 6 months the risk adjusted returns are given in table IV and V.

The process for nearness raw returns is similar, expect for the fact that the nearness method uses a 12-month farming period because this method uses the 52-week-high as the sorting mechanism. The stocks are sorted based on the nearness of the current price (beginning of the month) to the 52-week-high price. The portfolios are then held for 3,6,9,12 or 15 months. Once again these results are collapsed to achieve one observation per decile per month. This results in the raw results shown in table II. For a holding period of 6 months the risk adjusted returns are given in table VI and VII.

In order to check if one of the methods dominates the other a 5x5 sorting method is used based on a 9 months framing period for J&T returns and a holding period of 6 months (for both methods). The stocks are first sorted and nearness and then on J&T past returns (both 5 quintiles) resulting in a total of 25 portfolios. This method is repeated for risk adjusted returns of both the CAPM and Fama & French 3 factor model and is also done sorting on J&T returns first and 52-week-high nearness after (the other way around). The results are shown in table VIII to XIII.

The risk adjusted return of the framing period of 9 months (J&T method) and holding period of 6 months is also divided in the month in which the portfolio requires its first return (month 1 meaning the portfolio is selected based on information prior to 1 January and the first return is achieved on 31 January). The results are shown in table XIV and XV and figure 1.

V. Results

All the results found in this paper are reported in this chapter. First the raw results of the J&T method (table II) and the raw results of nearness sorting (table III) are reported in section I of this chapter. In section II the raw results are adjusted for known measurements of risk. The abnormal return is reported as alpha for the CAPM model and the Fama & French 3 factor model. The abnormal returns for the J&T method are reported in table IV for the CAPM model and table V for the Fama & French 3 factor model. The abnormal returns for nearness sorting can be found in table VI for the CAPM model and VII for the Fama & French 3 factor model. In section III the raw results of double sorting are reported. First the raw returns of the nearness effect are measured after sorting for 5 J&T quintiles in table VIII. Then the raw returns of the J&T sorting is measured after sorting for 5 nearness quintiles in table IX. This method is repeated in section IV for the abnormal returns based on the CAPM model and the Fama & French 3 factor model. The results of abnormal results of the nearness effect, after sorting for 5 J&T quintiles can be found in table X for the CAPM model and table XI for the Fama & French 3 factor model. The abnormal returns of the J&T method after sorting for 5 nearness quintiles can be found in XII for the CAPM model and table XIII for the Fama & French 3 factor model. In section 5 the results of the month of the year effect are reported. This effect measures the average abnormal return of the J&T method and the nearness method for each of the calendar months in which the portfolio is constructed. The results are reported in table XIV for the J&T method and table XV for the nearness method. These results measure the volatility of the methods across months. A summary of these tables is reported in figure I showing the difference in volatility across the two methods.

V.I. Raw results

The first section looks at the raw results of the J&T method (table II) and the nearness method (table III). For each method there is a framing period and a holding period. For the nearness method the framing period is always equal to 12 months because this method compares the current price with the 52-week high price. For the J&T method the framing period can vary. The holding period can vary in both models. The results of the J&T sorting method and nearness sorting method are both distributed in 10 deciles each. The 1st decile contains the buy portfolio and the 10th decile contains the sell portfolio. The difference between these portfolios is also reported.

Table II

Raw results of the J&T framework for different framing and holding periods.

First the raw data is sorted by past returns according to the J&T framework. This includes framing periods of 3,6,9 and 12 months and holding periods of 3,6,9 and 12 months. The portfolios are first sorted on the average past return of the months in the framing periods. The portfolios are sorted in 10 deciles and the average return of the holding period is presented in the table. The portfolio is formed directly after the framing period ends. According to the J&T framework the "buy portfolio" containing the stocks with the highest return during the framing period should have a higher return during the holding period than stocks in the "sell portfolio" containing the worst performing stocks during the framing period. The sample period is 1926-2015.

Framing Period (months)	Method by portfolio	Holding period (months)			
		3	6	9	12
3	Sell	0.0164	0.0142	0.0138	0.0133
		(7.83)	(9.94)	(12.52)	(13.78)
3	Buy	0.0123	0.0139	0.0147	0.0152
		(7.74)	(12.16)	(15.74)	(18.65)
3	Buy-Sell	-0.0040	-0.0003	0.0009	0.0019
		(-1.53)	(-0.15)	(0.61)	(1.48)
6	Sell	0.0147	0.0128	0.0121	0.0129
		(6.76)	(9.05)	(11.01)	(13.24)
6	Buy	0.0144	0.0158	0.0163	0.0157
		(9.24)	(13.30)	(16.99)	(18.81)
6	Buy-Sell	-0.0003	0.0030	0.0042	0.0028
		(-0.11)	(1.63)	(2.88)	(2.16)
9	Sell	0.0132	0.0114	0.0120	0.0132
		(6.30)	(8.17)	(10.96)	(13.54)
9	Buy	0.0162	0.0171	0.0164	0.0154
		(9.52)	(13.79)	(16.69)	(18.19)
9	Buy-Sell	0.0030	0.0057	0.0043	0.0023
		(1.12)	(3.06)	(2.95)	(1.76)
12	Sell	0.0114	0.0116	0.0127	0.0139
		(5.49)	(8.27)	(11.37)	(14.18)
12	Buy	0.0171	0.0164	0.0157	0.0146
		(9.86)	(13.25)	(15.97)	(17.24)
12	Buy-Sell	0.0056	0.0049	0.0030	0.0007
		(2.07)	(2.60)	(2.00)	(0.51)

In the table we can see that a short framing period combined with a short holding period leads to insignificant results. It is not clear whether the returns average returns of the Buy portfolio differ from the Sell portfolio. This is also the case when long framing periods are combined with long

holding periods (e.g. 12 months framing and 12 months holding). The highest return of the J&T sorting method is achieved with a framing period of 9 months and a holding period of 6 months. This is in line with the first paper of Jegadeesh & Titman (1993) although the returns of this research are higher due to a different sample period (1965-1989). During this period the method performed better than during the entire sample used in this thesis. Although the raw returns are not as high as one would expect this method yields an result of 0.57% on a monthly basis resulting in a return of over 7% a year. Next are the returns of the nearness method.

Table III

Raw results of the nearness framework for different holding periods.

First the raw data is sorted by nearness of the current price to the 52-week-high price. This includes holding periods of 3,6,9 and 12 months. The portfolios are sorted in 10 deciles and the average return of the holding period is given in the table. According to this framework the "buy portfolio" containing the stocks with the highest return during the framing period should have a higher return during the holding period than stocks in the "sell portfolio" containing the worst performing stocks during the framing period. The sample period is 1926-2015.

Holding period	Method (by portfolio)		
	Buy	Sell	Buy-Sell
3	0.0126	0.0175	-0.0050
	(13.08)	(7.11)	(-1.89)
6	0.0129	0.0162	-0.0033
	(18.15)	(9.86)	(-1.83)
9	0.0130	0.0165	-0.0035
	(21.66)	(13.00)	(-2.48)
12	0.0127	0.0170	-0.0043
	(23.79)	(15.32)	(-3.52)
15	0.0120	0.0178	-0.0058
	(25.10)	(17.86)	(-5.25)

As we can see the buy-sell portfolios lead to significant negative returns. Although this may come as a surprise this does not mean that the technique is useless. In order to compare this technique with the J&T sorting it is useful to use risk-adjusted results, reported in the next section.

V.II. Risk adjusted returns

To better compare the 52-week-high nearness method with the J&T framework this chapter looks at the risk-adjusted returns. The alpha, the outperformance measure, is taken to compare the buy with the sell portfolio of both methods. For this method only the 9 months framing and 6 months holding portfolios are given because this is the most common technique used in previous literature and yields the highest raw return for the J&T method (table II). By focusing on just one method, the portfolios can be seen in more detail.

Table IV

Risk-adjusted results of the J&T framework with a 9 months framing and 6 months holding period according to the CAPM model

The first model is based on the CAPM assumptions of risk. The alpha of the 9 months framing and 6 months holding portfolio is reported in the table below. The alpha indicates the abnormal return according to the CAPM model. The sample period is 1926-2015.

Portfolio	Alpha	Market Beta
1	0.0046	0.0150
	(6.94)	(54.62)
2	0.0041	0.0127
	(8.10)	(61.07)
3	0.0031	0.0122
	(7.08)	(66.67)
4	0.0028	0.0121
	(6.61)	(67.62)
5	0.0023	0.0117
	(5.84)	(72.32)
6	0.0014	0.0120
	(3.51)	(73.00)
7	0.0011	0.0125
	(2.60)	(69.15)
8	0.0005	0.0129
	(0.94)	(63.50)
9	-0.0009	0.0137
	(-1.46)	(55.08)
10	-0.0016	0.0157
	(-1.81)	(43.13)
P1-P10	0.0062	-0.0007
	(5.13)	(-0.96)

As we can see in this table the portfolio with the highest return in the past 9 months is the first decile (buy-portfolio). The buy portfolio has the highest alpha indicating that this portfolio has the highest abnormal return based on the CAPM model. The return is decreasing across the deciles and even negative (although not significant) for the 10^{th} decile. The difference between the buy and sell portfolio is an abnormal return of 0.62% on a monthly basis. Resulting in a yearly outperformance of 7.7% (higher than the raw monthly return of 0.57% reported in table II) .There is no significant difference in the market beta factor for the buy and sell portfolio.

Table V

Risk-adjusted results of the J&T framework with a 9 months framing and 6 months holding period according to Fama & French 3 factor model

The second model is based on the Fama & French assumptions of risk. The alpha of the 9 months framing and 6 months holding portfolio is reported in the table below. The alpha indicates the abnormal return according to the Fama & French 3 factor model. The sample period is 1926-2015.

Portfolio	Alpha	Market Beta	SMB Beta	HML Beta
1	0.0029	0.0115	0.0116	0.0035
	(6.59)	(58.13)	(35.11)	(13.43)
2	0.0025	0.0100	0.0087	0.0035
	(8.23)	(71.19)	(37.64)	(18.78)
3	0.0016	0.0098	0.0075	0.0037
	(6.18)	(82.77)	(38.03)	(23.68)
4	0.0013	0.0097	0.0071	0.0038
	(5.23)	(85.46)	(37.96)	(25.51)
5	0.0008	0.0095	0.0064	0.0038
	(3.69)	(98.18)	(39.94)	(29.68)
6	-0.0001	0.0100	0.0062	0.0039
	(-0.47)	(93.20)	(35.33)	(27.60)
7	-0.0004	0.0102	0.0065	0.0040
	(-1.51)	(80.61)	(30.97)	(23.65)
8	-0.0012	0.0105	0.0068	0.0045
	(-3.69)	(68.64)	(26.72)	(21.81)
9	-0.0027	0.0110	0.0081	0.0048
	(-6.19)	(54.23)	(24.14)	(17.66)
10	-0.0038	0.0119	0.0123	0.0049
	(-5.48)	(37.95)	(23.73)	(11.84)
P1-P10	0.0066	-0.0003	-0.0008	-0.0014
	(6.45)	(-0.50)	(-0.86)	(-1.73)

Just like the CAPM model, the Fama & French 3 factor model leads to a significant difference of abnormal return of the buy and sell portfolio. There is no significant difference in any of the 3 factors used between the 1st and 10th decile. The abnormal return according to the Fama & French model is 0.66% per month.

The same methodology is used to look at the risk adjusted return of the nearness method with the same holding period of 6 months. The results can be found in table VI and VII.

Table VI

Risk-adjusted results of the Nearness framework with a 6 months holding period according to the CAPM model

The first model is based on the CAPM assumptions of risk. The alpha of the 6 months holding portfolio is reported in the table below. The alpha indicates the abnormal return according to the CAPM model. The sample period is 1926-2015.

Portfolio	Alpha	Market Beta
1	0.0043	0.0090
	(13.16)	(66.93)
2	0.0036	0.0095
	(12.53)	(80.12)
3	0.0034	0.0104
	(10.91)	(81.32)
4	0.0026	0.0115
	(7.37)	(78.82)
5	0.0019	0.0123
	(4.84)	(74.90)
6	0.0014	0.0132
	(2.95)	(68.53)
7	0.0004	0.0141
	(0.70)	(64.80)
8	-0.0004	0.0154
	(-0.69)	(59.13)
9	-0.0009	0.0168
	(-1.16)	(53.89)
10	0.0015	0.0184
	(1.42)	(42.42)
P1-P10	0.0028	-0.0094
	(2.46)	(-12.85)

The risk-adjusted results of the nearness method are surprising. The raw results the nearness method are negative (as reported in table III) but, because of a significant difference in the market beta associated with the 1st and 10th decile, this method does have a positive abnormal return for a 6 months holding period. To further look at the risks of the nearness method the Fama &French factors are reported in the table below.

Table VII

Risk-adjusted results of the Nearness framework with a 6 months holding period according to the Fama & French 3 factor model.

The second model is based on the Fama & French assumptions of risk. The alpha of the 6 months holding portfolio is reported in the table below. The alpha indicates the abnormal return according to the Fama & French 3 factor model. The sample period is 1926-2015.

Portfolio	Alpha	Market Beta	SMB Beta	HML Beta
1	0.0037	0.0079	0.0038	0.0012
	(13.03)	(60.69)	(17.49)	(6.80)
2	0.0028	0.0083	0.0036	0.0018
	(12.38)	(79.30)	(20.63)	(12.85)
3	0.0023	0.0088	0.0047	0.0025
	(11.48)	(94.18)	(30.02)	(20.31)
4	0.0013	0.0096	0.0057	0.0032
	(6.36)	(100.92)	(36.17)	(25.24)
5	0.0004	0.0100	0.0069	0.0037
	(2.06)	(107.22)	(44.21)	(30.06)
6	-0.0004	0.0104	0.0083	0.0043
	(-1.66)	(100.60)	(48.07)	(31.18)
7	-0.0016	0.0111	0.0092	0.0049
	(-5.81)	(88.69)	(43.98)	(29.22)
8	-0.0027	0.0117	0.0111	0.0057
	(-8.51)	(79.78)	(45.47)	(28.92)
9	-0.0034	0.0126	0.0128	0.0061
	(-7.75)	(62.85)	(38.47)	(22.86)
10	-0.0016	0.0133	0.0159	0.0074
	(-2.19)	(39.48)	(28.25)	(16.59)
P1-P10	0.0053	-0.0054	-0.0121	-0.0063
	(5.44)	(-8.20)	(-14.13)	(-8.20)

When corrected for more measurements of risk, the nearness method yields an even higher return. The abnormal return is almost as high as the abnormal return of the J&T framework (0.53% compared to 0.66%). All the Fama & French factors are significantly higher for the 10th decile compared to the 1st decile meaning that there is a higher risk associated with the sell

portfolio compared to the buy-portfolio. Correcting for risk does therefore result in a positive abnormal return for the nearness method although the initial raw returns of this method came out negative.

V.III. Double sorting raw results

To see if the J&T framework and the nearness method are two separate effects double sorting is used. As described in chapter 4 this method does first sort on 5 quintiles of past returns with a 9 month framing period and then sorts on the nearness for 5 quintiles which results in 25 quintiles. The quintiles are compared to see if the J&T framework of past returns dominates the 52-week high nearness method.

Table VIII

Raw results of double sorting of J&T framework and Nearness method with 5 quintiles each.

The raw results of the 25 double sorted quintiles are reported in the table below. The difference between the 5th quintile and the 1st quintile of each J&T quintile is given to see the effect of nearness sorting within the J&T quintiles. The net effect of the J&T framework and the nearness method is also given. This effect can be seen as the difference of the 1st and 5th quintile of the total of the other measure. The sample period is 1926-2015.

		Nearness quintiles						
		1	2	3	4	5	ALL	1-5
J&T past return quintiles	1	0.0154	0.0156	0.0158	0.0157	0.0178	0.0160	-0.0024
		(16.92)	(15.79)	(14.34)	(12.28)	(11.74)	(30.45)	(-1.34)
	2	0.0122	0.0128	0.0138	0.0139	0.0154	0.0136	-0.0032
		(17.18)	(15.81)	(14.81)	(12.57)	(11.45)	(30.26)	(-2.13)
	3	0.0109	0.0114	0.0124	0.0130	0.0138	0.0123	-0.0029
		(16.78)	(14.99)	(13.52)	(12.02)	(10.49)	(28.26)	(-1.97)
	4	0.0102	0.0113	0.0117	0.0119	0.0139	0.0118	-0.0037
		(14.20)	(13.26)	(11.71)	(10.32)	(9.84)	(24.99)	(-2.34)
	5	0.0098	0.0102	0.0100	0.0105	0.0154	0.0112	-0.0055
		(10.49)	(9.29)	(7.91)	(7.38)	(8.77)	(18.85)	(-2.79)
	ALL	0.0117	0.0123	0.0127	0.0130	0.0152	0.0130	***-0.0036***
		(32.89)	(30.09)	(27.09)	(23.90)	(23.09)	(58.16)	***(-4.74)***
	1-5	0.0056	0.0054	0.0058	0.0051	0.0024	***0.0049***	
		(4.26)	(3.66)	(3.48)	(2.67)	(1.03)	***(6.12)***	

As we can see in table VIII the effect of the J&T framework is consistent and positive (0.49% on average) This is slightly lower than the raw returns of only the J&T framework (0.57% on average). As expected the Nearness method has a negative effect on the average monthly return. This is because the raw results are compared which are negative for the nearness method. It is likely that this will change when the abnormal returns are compared. As for now the effect of nearness sorting is -0.36% per month. Although the nearness method effect is negative it is still significant so this based on this table there is no evidence of the J&T sorting dominating the nearness sorting. To see the effect of sorting on J&T past returns after sorting for nearness the sorting is turned around.

Table IX

Raw results of double sorting of Nearness method and J&T framework with 5 quintiles each.

The raw results of the 25 double sorted quintiles are reported in the table below. The difference between the 5th quintile and the 1st quintile of each Nearness quintile is given to see the effect of J&T sorting within the Nearness quintiles. The net effect of the J&T framework and the nearness method is also given. This effect can be seen as the difference of the 1st and 5th quintile of the total of the other measure. The sample period is 1926-2015.

		J&T past return quintiles						
		1	2	3	4	5	ALL	1-5
Nearness quintiles	1	0.0165	0.0139	0.0121	0.0111	0.0100	0.0127	0.0065
		(16.25)	(17.48)	(17.53)	(18.05)	(16.98)	(37.44)	(5.52)
	2	0.0161	0.0139	0.0125	0.0115	0.0102	0.0128	0.0058
		(14.89)	(15.51)	(15.24)	(14.90)	(14.28)	(33.08)	(4.52)
	3	0.0150	0.0138	0.0124	0.0116	0.0105	0.0127	0.0045
		(12.40)	(13.00)	(12.43)	(12.46)	(12.37)	(27.81)	(3.03)
	4	0.0148	0.0133	0.0119	0.0112	0.0101	0.0123	0.0047
		(11.12)	(10.53)	(10.19)	(9.90)	(9.33)	(22.86)	(2.74)
	5	0.0186	0.0148	0.0130	0.0118	0.0133	0.0143	0.0053
		(11.75)	(10.01)	(8.90)	(7.75)	(8.17)	(20.80)	(2.34)
	ALL	0.0162	0.0139	0.0124	0.0114	0.0108	0.0130	***0.0054***
		(28.73)	(27.67)	(26.07)	(25.54)	(23.27)	(58.31)	***(7.34)***
	1-5	-0.0021	-0.0009	-0.0009	-0.0006	-0.0033	***-0.0016***	
		(-1.13)	(-0.56)	(-0.06)	(-0.39)	(-1.91)	***(-2.07)***	

As we can see, little has changed compared to table VIII. As expected, the net result of nearness sorting is negative although its effect is slightly lower. The effect of J&T past return sorting is 0.54%, slightly larger than the effect seen in table VIII. Once again, no evidence of domination is found.

V.IV. Double sorting risk-adjusted returns

In order to compare the nearness method with the J&T method it is better to compare with risk-adjusted results. The risk adjusted results of the double sorting technique are reported in this section using both the CAPM and Fama & French 3 factor model.

Table X

Risk-adjusted results of double sorting of J&T framework and Nearness method with 5 quintiles each based on the CAPM model.

The CAPM risk adjusted results of the 25 double sorted quintiles are reported in the table below. The difference between the 5th quintile and the 1st quintile of each J&T quintile is given to see the effect of nearness sorting within the J&T quintiles. The net effect of the J&T framework and the nearness method is also given. This effect can be seen as the difference of the 1st and 5th quintile of the total of the other measure. The sample period is 1926-2015.

		Nearness quintiles						
		1	2	3	4	5	ALL	1-5
J&T past return quintiles	1	0.0056	0.0051	0.0044	0.0029	0.0036	0.0043	0.0020
		(11.02)	(9.79)	(7.44)	(4.23)	(4.01)	(14.17)	(1.74)
	2	0.0036	0.0035	0.0035	0.0023	0.0021	0.0030	0.0015
		(10.74)	(9.13)	(7.71)	(4.07)	(2.86)	(12.23)	(1.53)
	3	0.0027	0.0023	0.0020	0.0015	0.0007	0.0018	0.0020
		(9.54)	(7.16)	(4.99)	(2.79)	(0.99)	(7.96)	(2.09)
	4	0.0015	0.0015	0.0007	-0.0001	0.0003	0.0008	0.0012
		(4.53)	(3.86)	(1.58)	(-0.20)	(0.39)	(3.05)	(1.14)
	5	-0.0003	-0.0011	-0.0025	-0.0028	0.0009	-0.0011	-0.0012
		(-0.49)	(-1.80)	(-3.40)	(-3.21)	(0.75)	(-2.96)	(-0.93)
	ALL	0.0026	0.0022	0.0016	0.0008	0.0015	0.0018	***0.0011***
		(14.00)	(10.73)	(6.63)	(2.51)	(3.77)	(13.40)	***(3.31)***
	1-5	0.0058	0.0062	0.0069	0.0058	0.0026	***0.0055***	
		(5.96)	(6.00)	(6.18)	(4.74)	(1.85)	***(15.17)***	

Table XI

Risk-adjusted results of double sorting of J&T framework and Nearness method with 5 quintiles each based on the Fama & French 3 factor model.

The Fama & French 3 factor risk adjusted results of the 25 double sorted quintiles are reported in the table below. The difference between the 5th quintile and the 1st quintile of each J&T quintile is given to see the effect of nearness sorting within the J&T quintiles. The net effect of the J&T framework and the nearness method is also given. This effect can be seen as the difference of the 1st and 5th quintile of the total of the other measure. The sample period is 1926-2015.

		Nearness quintiles						
		1	2	3	4	5	ALL	1-5
J&T past return quintiles	1	0.0046	0.0038	0.0028	0.0010	0.0011	0.0027	0.0036
		(10.97)	(9.59)	(6.77)	(2.40)	(1.70)	(11.55)	(3.62)
	2	0.0028	0.0024	0.0021	0.0004	-0.0005	0.0014	0.0033
		(9.72)	(7.93)	(6.53)	(1.22)	(-1.20)	(7.73)	(4.08)
	3	0.0021	0.0013	0.0005	-0.0004	-0.018	0.0003	0.0039
		(8.04)	(5.03)	(1.92)	(-1.40)	(-4.49)	(1.83)	(4.97)
	4	0.0009	0.0004	-0.0009	-0.0022	-0.0024	-0.0008	0.0034
		(2.95)	(1.19)	(-2.63)	(-6.10)	(-4.54)	(-3.99)	(3.75)
	5	-0.0015	-0.0028	-0.0045	-0.0052	-0.0019	-0.0032	0.0005
		(-3.21)	(-5.64)	(-8.06)	(-7.80)	(-1.89)	(-9.86)	(0.38)
	ALL	0.0018	0.0010	0.0000	-0.0013	-0.0011	0.0001	***0.0029***
		(10.60)	(5.91)	(0.03)	(-6.33)	(-3.88)	(0.84)	***(9.97)***
	1-5	0.0061	0.0066	0.0073	0.0062	0.0030	***0.0058***	
		(6.71)	(7.23)	(7.64)	(6.13)	(2.40)	***(18.13)***	

The net effect of both the nearness method as the J&T past return method is similar to the results found in the tables IV and V. When we look at the effect of the J&T sorting it is stable across the nearness quintiles. However, when we look at the 5th quintile of nearness we see that the effect is lower (0.30% compared to 0.58% on average). Although this effect is small, it is still significantly higher than 0. The J&T sorting performs worse with firms that have a low nearness. This is not surprising since the J&T framework states that recent winners will perform better in the future. Within the category of low nearness firms (firms that are far away from their 52-week high price) the J&T sorting performs rather poor. But in fact, none of those firms are really recent 'winners' because their 52-week high price far away. We see the same with firms that performed poor in terms of return of the past 9 months. The nearness method within the 5th quintile of the J&T sorting (thus with the lowest past return) performs poorly. The nearness

method on these firms leads to a result that is slightly positive but not significantly different from zero on any significant level. Within firms that performed poor based on the one of the measurements of momentum, momentum investing performs poorly. With this in mind the table explains to us that momentum investing is poor in terms of selecting the 'least bad stocks'. With double sorting the momentum investing works best with median stocks (3^{rd} quintile). Also important is to notice that, although the return of the J&T framework remains similar values found earlier (0.55% compared to 0.62% and 0.58% compared to 0.66%), the effect of the nearness method decreased substantially (0.11% compared to 0.28% and 0.29% compared to 0.53%). This means that, when sorting for J&T past returns first, part of the nearness effect disappears. The J&T method does not dominate the nearness method but it does weaken its effect supporting the claim that these two methods are based on the same profitable foundation.

Just like table X and XI, the next two tables will show risk adjusted returns based on the CAPM model and the Fama & French 3 factor model. The only difference is the sorting order. By sorting on 5 nearness quintiles first and 5 quintiles for past returns according to the J&T framework after I check for the possibility of domination of the J&T method by the nearness framework.

Table XII

Risk-adjusted results of double sorting of Nearness method and J&T framework with 5 quintiles each based on the CAPM model.

The CAPM risk adjusted results of the 25 double sorted quintiles are reported in the table below. The difference between the 5th quintile and the 1st quintile of each nearness quintile is given to see the effect of J&T sorting within the nearness quintiles. The net effect of the nearness framework and the J&T method is also given. This effect can be seen as the difference of the 1st and 5th quintile of the total of the other measure. The sample period is 1926-2015.

		J&T past return quintiles						
		1	2	3	4	5	ALL	1-5
Nearness quintiles	1	0.0058	0.0047	0.0036	0.0032	0.0024	0.0039	0.0034
		(10.61)	(12.23)	(11.83)	(11.87)	(8.70)	(22.13)	(3.83)
	2	0.0046	0.0037	0.0028	0.0023	0.0015	0.0030	0.0031
		(8.73)	(9.40)	(8.35)	(6.83)	(4.73)	(16.27)	(3.45)
	3	0.0025	0.0023	0.0015	0.0012	0.0007	0.0016	0.0017
		(4.15)	(4.71)	(3.13)	(2.71)	(1.88)	(7.38)	(1.79)
	4	0.0014	0.0005	-0.0002	-0.0006	-0.0013	-0.0000	0.0027
		(2.09)	(0.75)	(-0.35)	(-0.98)	(-2.35)	(-0.12)	(2.54)
	5	0.0040	0.0007	-0.0008	-0.0023	-0.0005	(0.0002	0.0045
		(4.19)	(0.84)	(-0.90)	(-2.49)	(-0.45)	(0.50)	(3.19)
	ALL	0.0036	0.0024	0.0014	0.0008	0.0006	0.0017	***0.0031***
		(11.70)	(8.63)	(5.21)	(2.78)	(1.87)	(13.44)	***(9.06)***
	1-5	0.0018	0.0039	0.0044	0.0056	0.0029	***0.0037***	
		(1.53)	(3.66)	(4.19)	(5.22)	(2.52)	***(11.03)***	

Table XIII

Risk-adjusted results of double sorting of Nearness method and J&T framework with 5 quintiles each based on the Fama & French 3 factor model.

The Fama & French risk adjusted results of the 25 double sorted quintiles are reported in the table below. The difference between the 5th quintile and the 1st quintile of each nearness quintile is given to see the effect of J&T sorting within the nearness quintiles. The net effect of the nearness framework and the J&T method is also given. This effect can be seen as the difference of the 1st and 5th quintile of the total of the other measure. The sample period is 1926-2015.

		J&T past return quintiles						
		1	2	3	4	5	ALL	1-5
Nearness quintiles	1	0.0048	0.0039	0.0030	0.0027	0.0020	0.0033	0.0028
		(10.73)	(11.90)	(11.03)	(10.69)	(7.45)	(20.11)	(3.40)
	2	0.0032	0.0025	0.0017	0.0012	0.0007	0.0018	0.0025
		(8.76)	(8.94)	(7.01)	(4.63)	(2.61)	(12.77)	(3.19)
	3	0.0006	0.0006	-0.0002	-0.0004	-0.0005	0.0000	0.011
		(1.88)	(2.09)	(-0.84)	(-1.33)	(-1.58)	(0.12)	(1.42)
	4	-0.0008	-0.0019	-0.0023	-0.0026	-0.0031	-0.0022	0.0023
		(-2.06)	(-5.45)	(-6.59)	(-6.95)	(7.98)	(-12.35)	(2.74)
	5	0.0010	-0.0021	-0.0036	-0.0051	-0.0031	-0.0026	0.0041
		(1.46)	(-3.60)	(-6.31)	(-8.22)	(-3.36)	(-8.36)	(3.32)
	ALL	0.0018	0.0006	-0.0003	-0.0008	-0.0008	0.0001	***0.0026***
		(7.80)	(2.86)	(-1.38)	(-3.76)	(-2.94)	(0.80)	***(8.36)***
	1-5	0.0038	0.0060	0.0066	0.0079	0.0051	***0.0059***	
		(3.73)	(6.50)	(7.44)	(8.65)	(4.81)	***(19.72)***	

The results of table XII and XIII are surprising as they differ from the results of table X and XI. When only correcting for the market movement. The two methods of momentum investing result in similar results. We see that the effect of nearness sorting increases from 0.28% to 0.37% and from 0.53 to 0.59. This may be partly due to the difference in quintiles used to sort the data. The effect of J&T sorting however, decreases substantially from 0.62 to 0.31 and from 0.66 to 0.26%. The effect lost half of its returns. The table shows that, when first sorting for nearness, a large portion of the J&T returns disappear. Once again, supporting the statement that nearness and J&T sorting are partly based on the same profitable foundation. However, the fact that within the nearness quintiles, the returns of J&T sorting still results in significant positive returns claims that the two momentum sorting methods are not dominating each other.

V.V. The difference in holding months
Table XIV

Risk adjusted returns of the 9 months J&T framing and 6 months holding buy-and sell portfolios based on the month in which the portfolio is constructed.

In order to check whether the month of investment matters when investing in momentum related stocks the average monthly return of the 9 months J&T framing and 6 months holding portfolio is compared across the months in which these portfolios are constructed. The month in which the portfolio is constructed is also the month with the first return (e.g. if the portfolio is constructed on 1 January the framing period is March to December. The holding period is thus 1 January to 30 June, 6 months from the constructing day). The risk-adjusted returns based on the Fama & French 3 factor model of the buy and sell portfolio (based on 10 deciles) are given in the table below. The sample period is 1926-2015.

Month	Buy Alpha	Sell Alpha	Buy-Sell Alpha
1	-0.0000	0.0063	-0.0064
	(-0.02)	(2.09)	(-0.88)
2	0.0015	-0.0050	0.0065
	(1.05)	(-1.98)	(0.98)
3	0.0017	-0.0060	0.0077
	(1.09)	(-2.04)	(1.08)
4	0.0021	-0.0055	0.0076
	(1.30)	(-2.06)	(1.10)
5	0.0026	-0.0064	0.0089
	(2.09)	(-3.18)	(1.48)
6	0.0020	-0.0087	0.0107
	(1.43)	(-4.39)	(1.74)
7	0.0019	-0.0115	0.0134
	(1.17)	(-5.83)	(2.11)
8	0.0035	-0.0022	0.0057
	(2.47)	(-1.05)	(0.91)
9	0.0037	-0.0021	0.0057
	(2.42)	(-1.18)	(0.95)
10	0.0035	-0.0005	0.0040
	(2.19)	(-0.28)	(0.64)
11	0.0038	0.0006	0.0031
	(2.53)	(0.25)	(0.46)
12	0.0028	0.0028	0.0000
	(1.71)	(1.09)	(0.01)
ALL	0.0029	-0.0038	0.0066
	(6.59)	(-5.48)	(6.45)

In table XIV the first thing that catches the eye is the fact that the returns of January and December are very low. Months in the middle of the year seem to perform better (May – July). Note that most of the returns are not significant because of a lack of observations. The observations are first sorted in 10 deciles and thereafter divided in 12 months for each decile, leaving just one average observation per year for each specific month.

Table XV

Risk adjusted returns of the nearness 6 months holding buy-and sell portfolios based on the month in which the portfolio is constructed.

The average monthly return of the nearness 6 months holding portfolio is compared across the months in which these portfolios are constructed. The month in which the portfolio is constructed is also the month with the first return (e.g. if the portfolio is constructed on 1 January the framing period is March to December. The holding period is thus 1 January to 30 June, 6 months from the constructing day). The risk-adjusted returns based on the Fama & French 3 factor model of the buy and sell portfolio (based on 10 deciles) are given in the table below. The sample period is 1926-2015.

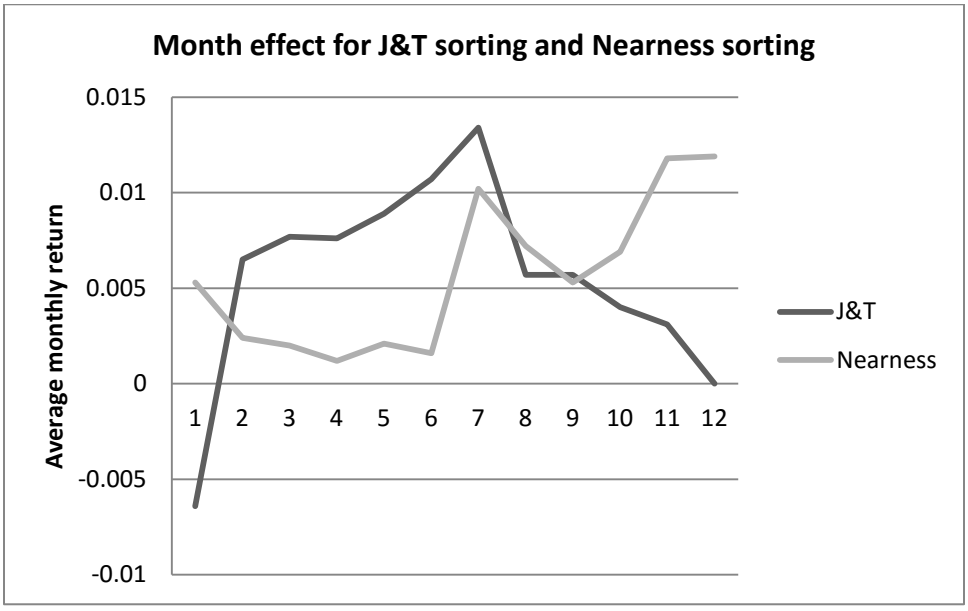
Month	Buy Alpha	Sell Alpha	Buy-Sell Alpha
1	0.0027	0.0025	0.0002
	(2.63)	(0.79)	(0.03)
2	0.0054	-0.0064	0.0119
	(5.24)	(-2.46)	(1.85)
3	0.0044	-0.0073	0.0118
	(4.72)	(-2.64)	(1.82)
4	0.0033	-0.0037	0.0069
	(2.96)	(-1.29)	(1.04)
5	0.0025	-0.0028	0.0053
	(3.36)	(-1.17)	(0.90)
6	0.0025	-0.0048	0.0072
	(2.81)	(-2.02)	(1.20)
7	0.0031	-0.0072	0.0102
	(2.40)	(-3.07)	(1.61)
8	0.0038	0.0022	0.0016
	(4.75)	(0.89)	(0.27)
9	0.0040	0.0018	0.0021
	(4.37)	(0.85)	(0.37)
10	0.0045	0.0033	0.0012
	(4.55)	(1.45)	(0.20)
11	0.0043	0.0023	0.0020
	(4.08)	(0.84)	(0.30)
12	0.0048	0.0024	0.0024
	(4.77)	(0.93)	(0.37)
ALL	0.0037	-0.0016	0.0053
	(13.03)	(-2.19)	(5.44)

Surprisingly, the return of December is not lower than the return in the previous months. The return of February and March are very high compared to the other months. Although these results may be driven by just a couple of extreme months in the history, the fact that the J&T framework results in different extreme months than the nearness method supports the claim that the two methods are partly based on different profitable foundations. To better understand the volatility in months the two buy-sell portfolios are shown in figure I.

Figure I

Results of table XIV and XV combined

The results of table XIV and XV are combined in the figure below to see the volatility in months of both the J&T framing as the nearness framing.



As the figure shows the J&T framing is more volatile across the year. Although the magnitude of J&T past returns is higher on average, for some starting months the nearness sorting performs better. Both methods perform well during July. The J&T framework performs well in the beginning of the year towards the middle of the year and crashes down after July. The nearness method however performs rather well during the last two months of the year. Once again, supporting the claim that nearness sorting and past return sorting are partly separate effects with their own volatility.

VI. Conclusion

Momentum investing has been research a lot in previous literature. However, momentum investing based on the 52-week high price and momentum investing based on past returns have not yet been compared over the full horizon of the CRSP database. Especially since momentum investing return vary over years it is useful to compare the two methods over a large period.

In order to answer the question if momentum investing based on past returns and momentum investing based on the 52-week-high price are separate effects the two methods are first analyzed. In table II it is already shown that momentum investing based on past returns according to the Jegadeesh & Titman framework is less profitable over the entire sample of the CRSP database (1926-2015) compared to the period used originally by Jegadeesh & Titman (1993). During the entire period the raw return of J&T sorting is equal to 0.57% compared to the 1.2% found by Jegadeesh & Titman. The risk adjusted return of the J&T method yields a return of 0.62% for the CAPM model (table IV) and 0.66% for the Fama & French 3 factor model (table V).

Surprisingly, the raw results of the 52-week-high method are negative for the entire period with a return of -0.33% (table III) . Although surprising, this does not mean that the method is useless. When looking at the abnormal return of the 6 months holding period the abnormal return of the nearness method is 0.28% for the CAPM model (table VI) and 0.53% for the Fama & French 3 factor model (table VII). The J&T framework has a higher magnitude for all of the models (raw results, CAPM adjusted results and Fama & French 3 factor adjusted results).

To see if the models are based on the same abnormal return generating principle, the methods are double sorted to check for domination of one of the methods over the other. In table VIII and IX this is done for the raw returns. Unsurprising, the return of the nearness method is negative. This does not mean that the J&T framework dominates the nearness framework because nearness still has a significant effect. To check for domination the abnormal returns of the CAPM model and the Fama & French 3 factor model is also double sorted (tables X to XIII). Especially the Fama & French models here are important (tables 11 and 13) because this seems to suit the nearness model the best. When corrected for J&T past return quintiles the effect of nearness sorting is 0.29%. Although this is lower than the previously reported 0.53% (table VII) for the Fama & French 3 factor model abnormal return it is still significantly positive meaning that the J&T

method does not dominate the nearness method. When this method is turned around for the abnormal return based on the Fama & French 3 factor model the return of. When corrected for 5 quintiles of nearness the J&T framework abnormal return is equal to 0.26%. Compared to the earlier found 0.66% (table V). This means that, when correcting for nearness, the J&T returns are decreased. In other words, the two methods are similar. However, the two momentum methods are not the same. A average monthly return of 0.26% is still a yearly 3.17% that nearness sorting could not explain. The two methods of investing are similar but definitely not the same.

To further investigate the differences between the two momentum strategies the monthly return of the buy-sell portfolio is reported per month in table XIII and XIV. Figure 1 summarizes this into a figure with the volatility of both models across months. The month of year effect is different for both momentum investment strategies. While J&T sorting leads (on average) to higher abnormal returns, the method seems to be more volatile. During February to July the J&T method performs well but in the other months in performs relatively poorly and even results into a negative abnormal return in January. The nearness method performs relatively well in January, July and November/December. The fact that both volatilities differ supports the claim that the two momentum investment strategies are different.

Are the George & Hwang method of 52-week-high nearness and the Jegadeesh & Titman method of past returns the same momentum investing strategies?

The nearness method and the J&T method are definitely not the same method, both methods are partly dominating each other, meaning that the methods are similar but not the same. When double sorting with Fama & French 3 factor model risk adjusted returns there is still a significant positive influence of both methods. When looking at the volatility across months of both stocks this claim is also supported because the two volatilities differ a lot across months.

In short, the George & Hwang method of 52-week high nearness and the Jegadeesh & Titman method of past returns are similar but definitely not the same.

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