52 Week High and Momentum Investing: A Partial Replication of George and Hwang's Results [1]

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[1]For access to the data used in this paper, contact David Kane of Kane Capital Management. A very special thanks to David Kane, David Phillips, and the rest of Economics 18 during the 2009 winter study at Williams College. The code which replicates the results in this paper is written in R [IG96] and is available from the authors.

Abstract

We replicate the momentum strategies in George and Hwang (2004) using large cap US stocks from 1998 through 2007. We examine their findings that the ratio of current stock price to 52-week high is a useful tool in forecasting future returns over 6 month horizons and receive discouraging results. We test a new strategy, ranking based on the recency of the 52-week high, and find it to be a much stronger indicator of portfolio performance. Portfolios formed using of 52-week high recency have an average return spread of 1.366% per month over 6 months, outperforming portfolios formed on the basis of 52-week high ratio by 1.192% per month on average.

Introduction

We compare one new and three previously discussed momentum-based portfolio formation strategies over six-month horizons. Jagadeesh and Titman (1993) (hereafter JT) investigates the effect of past returns on the future prices of individual stocks over short-term horizons [JT93]. Moskowitz and Grinblatt (1999) (hereafter MG) documents the effect of industry trends on individual stock returns [MG99]. George and Hwang (2004) (hereafter GH) shows that the ratio of current price to the 52-week high price is largely responsible for momentum investing profits. In doing so, GH performs pairwise comparisons of different momentum strategies, including those proposed in JT and MG. We partially replicate the pairwise comparisons from GH, focusing on 6-month future returns.

JT's methodology ranks stocks according to their past 6-month individual returns. Winner and loser portfolios are formed from the top and bottom deciles. The strategy is then to short the losers and go long the winners, with the winner-loser spread generating profits. As such, it is independent of overall market performance. MG's instead ranks industries based on their past 6-month value-weighted returns. It then forms portfolios that include all stocks in the top (bottom) 30% of the winner (loser) industries. GH's strategy ranks stocks based on the proximity of their current price to their 52-week high price. Stocks are ordered according to the ratio $\frac{P_{i,t-1}}{high_{i,t-1}}$ where $P_{i,t-1}$ is the price of stock i at the end of month $t-1$ and $high_{i,t-1}$ is the highest price of stock i during the 12-month period ending on the last day of month $t-1$. We standardize these three portfolio formation strategies as in GH, forming winner and loser portfolios of comparable size and performing comparisons using identical data.

Specifically, we partially replicate the methods of Tables I and IV from George and Hwang (2004). They can be found on pages 2148 and 2153 respectively. GH Table I compares average monthly returns for three momentum investing strategies: JT's individual stock momentum, MG's industry momentum, and GH's 52-week high ratio. It reports nearly identical monthly return spreads for all three strategies when independently employed; JT port-

folios net a 0.48% monthly spread with both MG and the 52-week high ratio returning 0.45% monthly. GH Table IV documents the pairwise comparisons of MG's industry momentum and GH's 52-week high ratio. Excluding January returns, when the 52-week high ratio is applied within industry momentum groupings, profits are two to four times as large as profits from industry momentum alone. Yet when January returns are included, both using GH's strategy within MG groups and using MG's strategy within GH groups are almost equally profitable [GH04].

In our replication, we use different data than that used in GH. While GH uses CRSP data from 1963 to 2001, we restrict our focus to the $1,500$ largest cap US stocks yearly, spanning the ten years from 1998 to 2007. We form portfolios based on 6-month past returns and 52-week high measures, and evaluate performance through 6-month future returns; so our universe is further limited to 2838 unique securities traded between 1999-01-31 and 2007-05-31. The modernity of our data offers a current perspective on momentum investing strategies, and we hope to achieve real-world applicability by using only large cap US stocks. Other authors have similarly applied GH's strategy to unique data sets with favorable results. Marshall and Cahan (2005) applies 52-week high momentum investing to Australian stocks, achieving an average monthly return of 2.14% [MC05].

Comparisons of the JT, MG, and GH strategies show significant differences in performance. We find that the ratio of a current stock price to its 52-week high is a significantly weaker predictor of future returns than either industry or individual stock momentum. Of the three strategies, MG's industry momentum is the strongest, with an average 1.357% return per month over the next 6 months. JT's individual stock momentum performs second best with an average spread of 0.888% per month over 6 months. GH is by far the weakest, with an average monthly spread of 1.043%, less than one fourth of JT and one seventh of MG.

We analyze a new portfolio strategy that ranks stocks by the recency of the date on which their 52-week high was recorded, achieving strong results. We sort stocks based on 52-week high recency and form three portfolios: close, medium, and far. Close outperforms medium, and medium outper-

forms far. The average spread between the close and far portfolios is 0.082%. 52-week high recency applies the same principles as the 52-week high ratio; it capitalizes on the market's slow reaction to new information. Unlike the 52-week high ratio, it accounts for smaller volatility in the market. If a stock rarely fluctuates, it will always be near its 52-week high and will always be placed in the winner portfolio according to GH's strategy. However, our strategy takes into account *when* the 52-week high was last recorded, and take advantage of the market's slow reaction to new information. so the slowness of market reaction to new information can be taken advantage.

Data and Methods

The core of our data consists of daily statistics for 3083 securities, spanning from 1999-01-31 to 2007-05-31. To form this core, we go to the December 31^{st} preceding each year from 1998 to 2007, and we list the $1,500$ largest cap US stocks. All daily information on any stock that appeared in at least one of those lists is part of the core of our universe. All return calculations are done on all stocks in our core. However, in order to be included in a portfolio in a given date, a stock must be in the top $1,500$ largest in terms of market capitalization as of the last trading day of the previous year.

We eliminate stocks with returns exceding 200% over consecutive trading days. Such excessive returns are the result of data errors and/or abnormal corporate actions. These data points dominated our results in initial testing, leading to less meaningful conclusions. We remove any rows that correspond to returns exceeding 200% rather than removing all data for those stocks. In total, we remove 1293 rows, less than 0.02% of the rows from our original data set.

Once we have the core, we must calculate 6-month past and future returns for both individual stocks and by industry, as well as the 52-week high. Any portfolios formed on days for which we do not have data spanning both the previous year and the next 6 months cannot be evaulated for all strategies, so those dates are dropped. For this reason, our first portfolios are not formed until 1999-01-31, and our last portfolios are formed on 2007-05-31.

For every stock and every date in our universe, we calculate past 1-month returns, past 6-month returns, forward 6-month returns, and the 52-week high price. We also calcuate the past 6-month industry returns by aggregating the returns of all stocks within each industry, regardless of whether each stock is in the top $1,500$ market cap at the time. For both JT's and MG's strategies, we form portfolios based on past 6-month data and hold those positions 6 months. The strategy is known as (6,6) hereafter. For JT portfolios, our (6,6) positions are formed by sorting stocks in ascending order based on individual past 6-month returns. We place the top (bottom) 33% into the winner (loser) portfolio, and the remaining stocks form the neutral portfolio. Within any month, each JT winner, loser, and nuetral portfolio is approximately equal in size. Winner portfolios are approximately equal in size across months as well. The same is true for loser and neutral portfolios.

Under MG's strategy, our (6,6) positions are formed through ordering industries by past 6-month industry returns. For each industry in the top (bottom) 33% of all industries, we put its member stocks into the winner (loser) portfolio, and the remaining stocks into the neutral portfolio. In any given month, the distribution of stocks within winner, loser, and neutral portfolios are unbalanced. Portfolios vary in size across months as well. This methodology is consistent with the strategy as outlined in MG, but our data has great variation in industry size.

To replicate GH's strategy, we form portfolios based on the relation of current stock prices to 52-week highs and hold the positions for 6 months. This relation can be expressed as $\frac{P_{i,t-1}}{high_{i,t-1}}$, where $P_{i,t-1}$ is the price of stock i at the end of month $t-1$ and $high_{i,t-1}$ is the highest price of of the stock i during the 12-month period ending on the last day of month $t-1$. Much like JT, we rank and divide stocks into winner, loser, and neutral portfolios that are approximately equally sized within and across months.

We equal-weight the three portfolios each month. By shorting the loser portfolio and use the money received from our short positions to go long on the winners, our strategy is market-neutral. We report the spread between the winner and the loser portfolios in Table 1.

Results

Table 1 presents average 6-month returns for the winner and loser portfolios of the three momentum investing strategies. The rightmost column shows the spread, the return achieved by shorting the loser stocks and going long the winner portfolio. This is a measurement of overall strategy performance. The first row of Table 1 presents JT's individual stock momentum results. The second row is for MG's industry momentum statistics, and the last row displays the returns for GH's 52-week high ratio portfolios.

Table 1: **Profits from Momentum Strategies**
This is a replication of GH's Table I on page 2148 [GH04]. This table reports the average monthly returns over 6-month holding periods for three different momentum investing strategies, spanning 1999-01-31 to 2007-05-31. JT portfolios are based on the past 6-month returns of individual stocks. MG portfolios are formed through sorting stocks by past 6-month industry returns. GH portfolios rank the ratio of current stock prices to their 52-week highs. In all cases, portfolios are held for 6 months. For each strategy, winner and loser portfolios are formed from the top and bottom 33%. Note that the top (bottom) 33% of industries does not necessarily contain the top (bottom) 33% of all stocks.

	Winner	Loser	Winner-Loser
JT's individual stock momentum	0.024	0.016	0.009
MG's industry momentum	0.025	0.011	0.014
GH's 52-week high	0.020	0.018	0.002

On average, JT's individual stock momentum returns a monthly spread of 0.888% per month over a 6 month period; MG's industry momentum 1.357%; and GH's 52-week high ratio 0.174%. The most profitable is MG's industry momentum, outperforming JT's individual stock momentum by 0.469%, and GH's 52-week high ratio by 1.183%.

Figure 1 reveals that returns from GH's 52-week high ratio exhibit a certain pattern where gains (losses) in any given month are carried onto subsequent months. It is due to the fact that we report the future 6-month returns of portfolios. Because portfolios are overlapped with their neighbor portfolios, they all exhibit relatively similar return patterns.

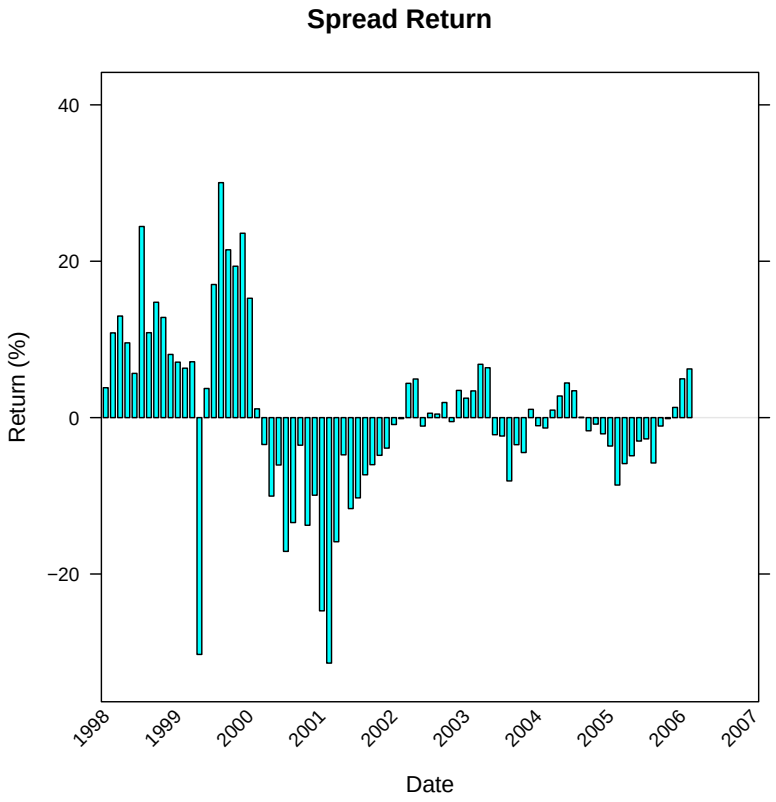

Figure 1: Monthly return spreads for 52-week high ratio

To test the dominance of GH's 52-week high ratio over MG's industry momentum, we conduct two pairwise comparisons as documented in Table **??**. On panel A, we divide all the stocks into three catalogues corresponding to the winner, neutral and loser portfolios as determined by GH's 52-week high ratio. Then, we form three sub-portfolios within each of these catalogue by applying MG's industry momentum on them separately. On panel B, we reverse the process and form three sub-portfolios within each winner, neutral, loser portfolio as determined by MG's industry momentum. Neither panels suggests dominace of GH's 52-week high ratio over MG's industry momentum.

The results are striking, epsecially in comparison to GH's. One explanation for these differences is the way we calculate monthly returns. In GH, the

return for any given month t is calculated as the equal-weighted average of the returns from the six separate self-financing portfolios formed in months $t-6$ to $t-1$. We calculate the overall return for any given month t as one sixth of the 6-month equal-weighted return of the portfolio formed in that specific month. However, we believe this difference in calculation methods is insufficient to explain the difference in our results. One hypothesis is that the market has become more effective due to faster diffusion of information, especially those readily available like the 52-week high price. This results in quicker market reassessment and a quicker price corrrection process. For this reason, strategies that employ ranking parameters less readily available to the public might return higher profit.

Figure 2 documents the cumulative spread return and the cumulative quantile return of three momentum investing strategies. Winner portfolios from MG's industry momentum exhibit the strongest growth pattern, followed by winner portfolios from JT's individual stock momentum and GH's 52-week high ratio in that order. The order is reversed for the loser portfolios. In terms of sorting stocks into proper portfolios, MG's industry momentum is most effective as evident in the wide spreads between its winner, neutral and loser portfolios. In the case of JT's individual stock momentum, neutral and loser portfolios exhibit an identical growth pattern though winner portfolios show a considerably stronger growth pattern. The least effective is GH's 52-week high ratio. Its loser and neutral portfolios perform almost identically during the whole 10 years, and its winner portfolios only perform slightly better.

Extensions

We employ a new portfolio formation strategy based on the recency of the 52-week high. Instead of calculating the ratio $\frac{P_{i,t-1}}{high_{i,t-1}}$ as in GH, we calculate the number of days that have passed since the latest occurrence of the 52-week high (in cases where the 52-week high is recorded on multiple days, we use the most recent date). We then rank stocks, sorting into winner, neutral, and loser portfolios. The 33% of stocks whose 52-week high occured most

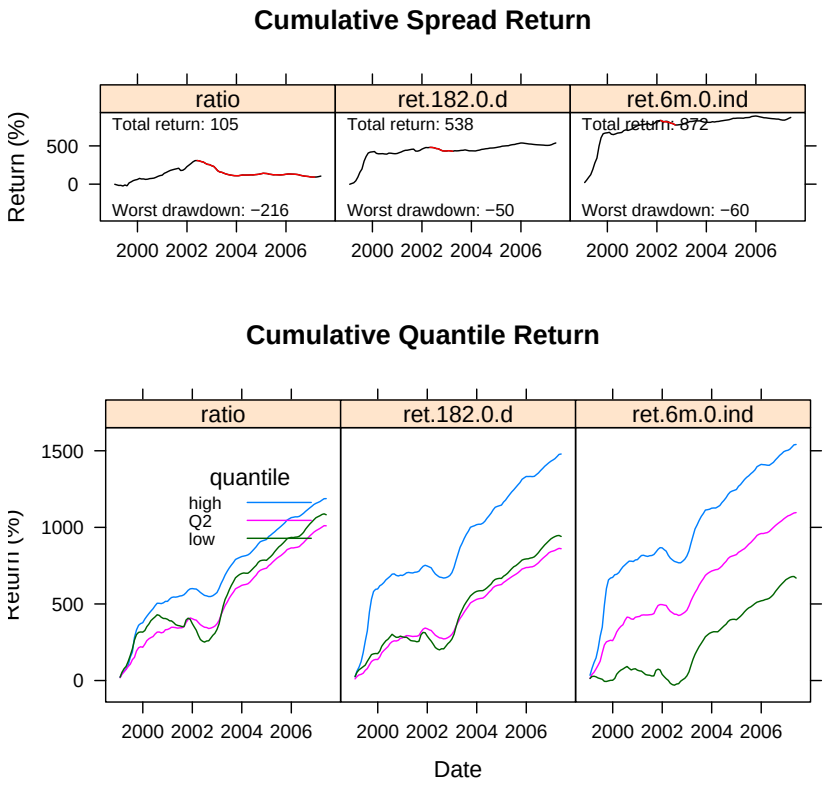

Figure 2: Cumulative Spread Return and Cumulative Quantile Return for JT, MG and GH

(least) recently are placed in the winner (loser) portfolio. The remaining stocks form the neutral portfolio. We form a self-financing market-neutral portfolio by going long on the winners and shorting the loser portfolios. The strategy is known as 52-week high recency hereafter.

The strategy grows out of an assumption that the market moves as a whole. Moreover, strong stocks tend to grow faster in bull markets and to hold up better in bear markets. It follows that strong stocks would stand a better chance than weak stocks to make a new 52-week high in both markets. Subsequently, stocks that have recently passed their 52-week high prices are more likely to be strong stocks than those that have not passed their 52-week high prices for a while. As a result, we believe factoring 52-week high recency into the 52-week high momentum strategy would improve its fore-

casting power.

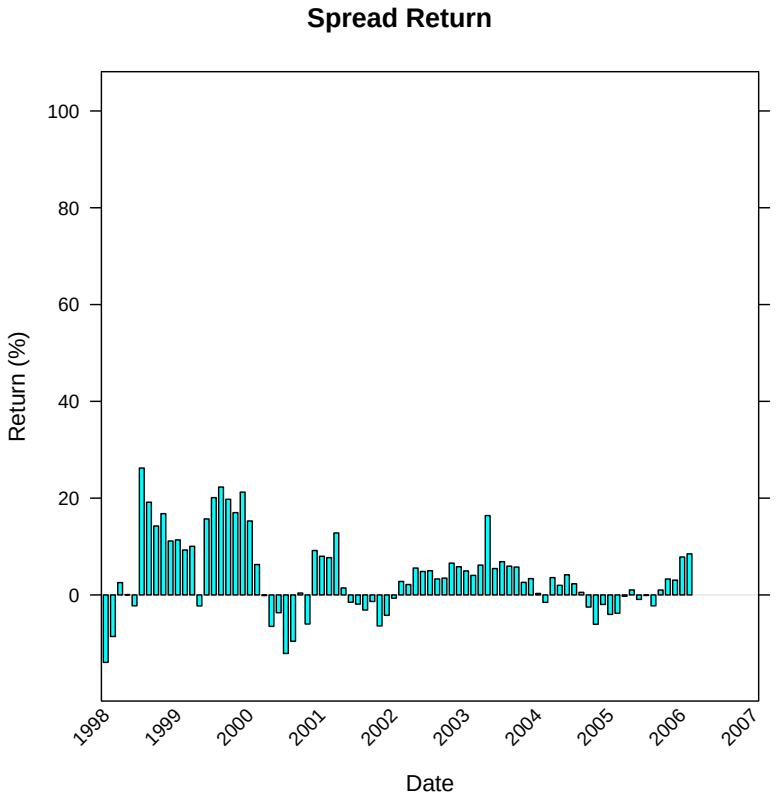

Figure 3: Monthly return spreads for 52-week high proximity

Empirically, we find 52-week high recency to be a strong measure of portfolio performance. 52-week high recency realizes an average profit of 0.014% per month over 6 months, almost 7 times the average returns of GH. Table 3 shows the average monthly returns of the winner, loser, and self financing portfolio generated by going long the winner portfolio and shorting the losers. The average spread compares favorably to the strategies proposed in JT, MG, and GH as seen in Table 1.

Figure 4 documents the cumulative spread return and the cumulative quantile return of both 52-week high ratio and 52-week high recency. It is important to note that, under both strategies, portfolios are constructed in a separate and equal-weighted manner so that no gain (loss) of one portfolio

is carried onto that of another. In terms of cumulative returns, winner and neutral portfolios from 52-week high recency considerably outperform those from 52-week high ratio. Nonetheless, the loser portfolios from 52-week high ratio outperforms those from 52-week high recency, especially during the period between 1999-2002. More importantly, 52-week high recency is much better in sorting stocks into proper winner, neutral and loser portfolios as shown in the wide spreads between their returns. 52-week high ratio, on the other hand, is not as effective. Stocks in loser and neutral portfolios perform almost identically during the whole 10 years while winner stocks only perform slightly better.

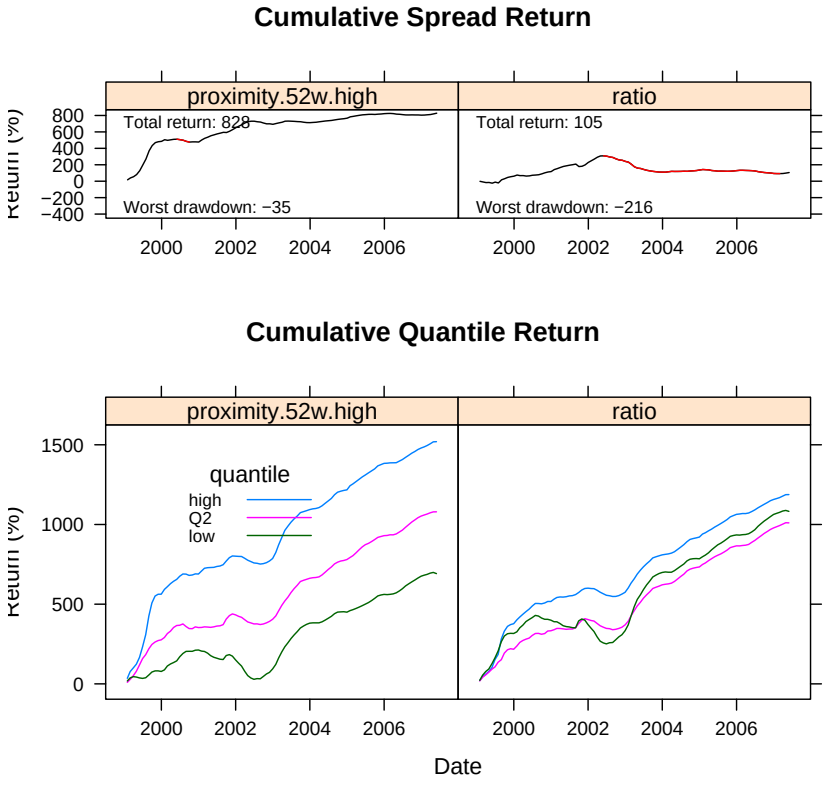

Figure 4: Cumulative Spread Return and Cumulative Quantile Return for the 52-week high recency (proximity.52w.high) and 52-week high ratio (ratio)

Our extension is partially motivated by Wang (2008) [Wan08], which documents a reversal fear in momentum investing. Wang (2008) suggests

an important case of underreaction that follows large price surges, which is sometimes associated with new 52-week highs. After such occurrences, people tend to question whether the positive information is already factored into prices and whether prices are sustainable at the new high. Traders are consequentially unwilling to bid a stock as high as its fundamental values suggest. Meanwhile, speculation investors are more likely to cash out. Altogether, they create a temporary sell pressure that pushes down the prices. The more recent the latest 52-week high is, the stronger the pressure is, especially when the sustainability of a recent price surge is uncertain. However, such pressure is only temporary, and the prices eventually rise as good news prevails. By going long on those stocks that have recently passed their 52-week highs, we can capture the momentum effect created by such irrational behavior.

Conclusion

We compare the profitability of three momentum investing strategies: JT's individual stock momentum, MG's industry momentum and GH's 52-week high ratio. JT's individual stock momentum takes long (short) positions on the top (bottom) 33% of stocks based on their past 6-month returns. The strategy was proposed by Jagadeesh and Titman (1993) and realizes an average monthly profit of 0.888% during the period between 1999-01-31 and 2007-05-31. MG's Industry momentum, which was proposed by Moskowitz and Grinblatt (1999), takes long (short) positions on stocks on the top (bottom) 33% industries based on the past 6-month returns of the industries. The strategy performs much better than JT's individual stock momentum and realizes an average monthly profit of 1.357% during the same period. GH's 52-week high ratio bases their measurement on the proximity of stock prices to their 52-week high prices, and takes long (short) positions on the top (bottom) 33% stocks ranked by that criteria. The strategy returns an average monthly profit of 0.174% over a 6-month period.

In contradiction of George and Hwang (2004), our results show that proximity to the 52-week high is a weaker indicator of future returns than past returns of either individual stock or of the whole industry. Our results are

actually consistent with the results of Alsubaie and Najand (2008) on momentum investing in the Saudi stock market, the largest market in the Middle East [AN08]. Their results of 52-week high strategy documents a reserval in stocks that have reached their 52-week high. Alsubaie and Najand attribute the differences to the diffusion of information and investor overreaction. They also suggest that investor speculation can move stocks to their 52-week high price. The stocks however fall back below their 52-week high price once more accurate news emerge in the market.

Nonetheless, our modified version of GH's 52-week high momentum strategy, which measures stock performance according to the recency of the 52-week high, realizes an average 6-month profit of 1.366%, almost 7 times the returns from GH. To the best of our knowledge, there is no existing paper dedicated to this version of the 52-week high momentum strategy. Hence, a more indepth study on the topic is very promising. Possible directions of future work include set ranges for categorizing recency instead of ranking stocks according to percentage. We could use 3 month, 3-6 month, and 6-12 month periods as recency categories. Pairwise testing of 52-week high recency within other momentum strategies would provide further insight.

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Table 2: **Pairwise Comparisons of the 52-Week High and Industry Momentum Strategies**
This is a partial replication of GH's Table IV on page 2153 [GH04]. Stocks are sorted independently by the ratio of their current price to the previous 52-week high price, and by the past 6-month industry returns. Industry momentum winners (losers) are stocks that fall within the top (bottom) 33% of the industries with the highest (lowest) 6-month returns. 52-week high winners (losers) are stocks that fall within the top (bottom) 33% of all ratios of current stock price to 52-week high price. Panel A reports the average monthly returns over 6-month holding periods from 1999-01-31 through 2007-05-31 for equal-weighted portfolios that are long 52-week high ratio winners and short 52-week losers *within* winner, neutral, and loser portfolios as identified by industry momentum rankings. Panel B reports the average monthly returns over 6-month holding periods from 1999-01-31 through 2007-05-31 for equal-weighted portfolios that are long industry momentum winners and short industry momentum losers *within* winner, neutral, and loser portfolios as identified by 52-week high ratio rankings.

Panel A:	52-week high *within* industry momentum	
Winner	Winner	0.024
	Loser	0.025
	Spread	-0.001
Neutral	Winner	0.015
	Loser	0.017
	Spread	-0.002
Loser	Winner	0.013
	Loser	0.012
	Spread	0.001
Panel B:	Industry momentum *within* 52-week high	
Winner	Winner	0.024
	Loser	0.012
	Spread	0.012
Neutral	Winner	0.024
	Loser	0.011
	Spread	0.013
Loser	Winner	0.025
	Loser	0.012
	Spread	0.013

Table 3: **Proximity to 52-week high**
Stocks are sorted independently by the number of days since their most recent 52-week high was recorded. Winners (losers) are stocks that fall within the top (bottom) 33% among stocks with the fewest (most) days since their 52-week high was recorded. Each column represents a separate portfolio, and returns are average monthly returns per month over a 6-month period.

	Winner	Neutral	Loser	Winner-Loser
Proximity to 52-week high (days)	0.025	0.018	0.011	0.014