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The 52-Week High and Momentum Investing

THOMAS J. GEORGE and CHUAN-YANG HWANG*

ABSTRACT

When coupled with a stock's current price, a readily available piece of information—the 52-week high price–explains a large portion of the profits from momentum investing. Nearness to the 52-week high dominates and improves upon the forecasting power of past returns (both individual and industry returns) for future returns. Future returns forecast using the 52-week high do not reverse in the long run. These results indicate that short-term momentum and long-term reversals are largely separate phenomena, which presents a challenge to current theory that models these aspects of security returns as integrated components of the market's response to news.

THERE IS SUBSTANTIAL EVIDENCE that stock prices do not follow random walks and that returns are predictable. Jegadeesh and Titman (1993) show that stock returns exhibit momentum behavior at intermediate horizons. A self-financing strategy that buys the top 10% and sells the bottom 10% of stocks ranked by returns during the past 6 months, and holds the positions for 6 months, produces profits of 1% per month. Moskowitz and Grinblatt (1999) argue that momentum in individual stock returns is driven by momentum in industry returns. DeBondt and Thaler (1985), Lee and Swaminathan (2000), and Jegadeesh and Titman (2001) document long-term reversals in stock returns. Stocks that perform poorly in the past perform better over the next 3 to 5 years than stocks that perform well in the past.

Barberis, Shleifer, and Vishny (1998), Daniel, Hirshleifer, and Subrahmanyam (1998), and Hong and Stein (1999) present theoretical models that attempt to explain the coexistence of intermediate horizon momentum and long horizon reversals in individual stock returns as the result of systematic violations of rational behavior by traders. In Barberis, Shleifer, and Vishny and in Hong and Stein, momentum occurs because traders are slow to revise their priors when new information arrives. Long-term reversals occur because when traders finally do adjust, they overreact. In Daniel, Hirshleifer, and Subrahmanyam, momentum occurs because traders overreact to prior information when new information confirms it. Long-term reversals occur as the overreaction is corrected in the long run. In all three models, short-term

*Bauer College of Business, University of Houston, and School of Business and Management, Hong Kong University of Science and Technology, respectively. We thank Joyce Berg, Mark Grinblatt, David Hirshleifer, Tom Rietz, and especially Sheridan Titman and the referee for helpful comments, and Harry Leung for excellent research assistance. George acknowledges financial support of the Bauer professorship and Hwang acknowledges financial support of RGC grant HKUST6011/00H.

momentum and long-term reversals are sequential components of the process by which the market absorbs news.

In this paper, we find that a readily available piece of information—the 52-week high price–largely explains the profits from momentum investing. We examine the 52-week high because the models predict, in particular, that traders are slow to react, or overreact, to *good* news. A stock whose price is at or near its 52-week high is a stock for which good news has recently arrived. This may be the time when biases in how traders react to news, and hence profits to momentum investing, are at their peaks. Indeed, we find that profits to a momentum strategy based on nearness to the 52-week high are superior to those where the arrival of news is measured by a return computed over a fixed-length interval in the past (e.g., 6 months).

Like the results in Jegadeesh and Titman (1993), these findings present a serious challenge to the view that markets are semistrong-form efficient. This finding is remarkable because the nearness of a stock's price to its 52-week high is among the information that is most readily available to investors. One need not even compute a past return. Virtually every newspaper that publishes stock prices also identifies those that hit 52-week highs and lows. For example, the *Wall Street Journal*, *Investors Business Daily*, *Financial Times*, and the *South China Morning Post* all print lists of these stocks each day, and *Barron's Magazine* prints a comprehensive weekly list of stocks hitting 52-week highs and lows.

Our most interesting results emerge from head-to-head comparisons of a strategy based on the 52-week high with traditional momentum strategies. We find that nearness to the 52-week high is a better predictor of future returns than are past returns, and that nearness to the 52-week high has predictive power whether or not stocks have experienced extreme past returns. This suggests that price *levels* are more important determinants of momentum effects than are past price changes.

An explanation of behavior that is consistent with our results is that traders use the 52-week high as a reference point against which they evaluate the potential impact of news. When good news has pushed a stock's price near or to a new 52-week high, traders are reluctant to bid the price of the stock higher even if the information warrants it.[1] The information eventually prevails and the price moves up, resulting in a continuation. Similarly, when bad news pushes a stock's price far from its 52-week high, traders are initially unwilling to sell the stock at prices that are as low as the information implies. The information eventually prevails and the price falls. In this respect, traders' reluctance to revise their priors is price-level dependent. The greatest reluctance is at price levels nearest and farthest from the stock's 52-week high. At prices that are neither near nor far from the 52-week high, priors adjust more quickly and there is no pronounced predictability when information arrives.

[1] The evidence in Grinblatt and Keloharju (2001) is consistent with this. They find price-level effects in investors, *trading* patterns. Using detailed data from the Finnish stock market, they find that investors are much more likely to sell (than hold or buy) a stock whose price is near a historical high, and more likely to buy (than sell) a stock that is near a historical low.

This description is consistent with results in experimental economics research on the "adjustment and anchoring bias" surveyed in Kahneman, Slovic, and Tversky ((1982), pp. 14–20). They report on experiments in which subjects are asked to estimate a quantity (e.g., the number of African nations in the UN) as an *increment* to a number that the subject observes was generated *randomly*. Estimates are higher (lower) for subjects that start with higher (lower) random numbers. Our results suggest that traders might use the 52-week high as an "anchor," like the random number in the experiments when assessing the increment in stock value implied by new information.

A similar phenomenon is documented in Ginsburgh and van Ours (2003), who examine the career success of pianists who compete in the Queen Elizabeth Piano Competition. The order in which competitors play both across the week of the competition and on the night they perform (two perform each night) predicts the judges' ranking, even though order is chosen *randomly*. The authors find that subsequent career success as measured by critical acclaim and number of recordings is significantly related to the component of the competition ranking that is related to order, i.e., the component that cannot be related to musicianship. Thus, the competition rankings are similar to the random number drawn in the "anchoring" experiments. The ranking is an anchor against which critics and the recording companies judge talent, which results in career momentum for musicians. This finding is noteworthy because critics and recording executives are professionals who have a financial stake in identifying intrinsic musical talent, similar to investors who attempt to identify the intrinsic value of a stock. Nevertheless, they appear to anchor on criteria that are unrelated to intrinsic talent.

We also examine whether long-term reversals occur when past performance is measured based on nearness to the 52-week high. They do not. This finding, coupled with those described above, suggests that short-term momentum and long-term reversals are not likely to be components of the same phenomenon as modeled by Barberis, Shleifer, and Vishny (1998), Daniel, Hirshleifer, and Subrahmanyam (1998), and Hong and Stein (1999). Our results indicate that short-term underreaction is best characterized as an anchoring bias that the market resolves without the overcorrection that results in long-term reversals. The explanation for long-term reversals lies elsewhere, suggesting that separate theories of short- and long-term predictability in prices may be more descriptive than a theory that integrates both phenomena into a "life cycle" of the market's response to news.

Our findings suggest that models in which agents' valuations depend on nearness of the share price to an anchor will be successful in explaining price dynamics. Two recent theoretical papers take this approach. In Klein's (2001) model, the representative agent is motivated by tax avoidance. His demand for shares is positively related to the imbedded capital gain, so the anchor is the price at which shares are acquired. Klein uses this structure to explain long-term return reversals. In Grinblatt and Han (2002), a subset of agents is subject to a disposition effect making them averse to selling shares that result in the recognition of losses. The anchor in their model is also the acquisition price of the shares, but demand functions are negatively related to imbedded gains. In the context of their model, Grinblatt and Han show that this dependence results in momentum behavior for stocks whose prices are at or near long-run (e.g., 52-week) highs and lows. We find that strategies based on Grinblatt and Han's anchor do generate significant profits that do not reverse. However, profits from this strategy are also strongly dominated by profits from the 52-week high strategy.

The rest of the paper is organized as follows. The next section describes our sampling procedure and how the investment strategies are implemented. Section II describes the results. Section III concludes.

I. Data and Method

In the tests that follow, we compare the momentum strategies of Jegadeesh and Titman (1993) (hereafter JT) and Moskowitz and Grinblatt (1999) (hereafter MG) to a strategy based on the nearness of a stock's price to its 52-week high.

The data are collected exactly as described in MG. We use all stocks on CRSP from 1963 to 2001. Two-digit SIC codes are used to form the 20 industries shown in Table I of MG. For every month from 1963 to 2001, a value-weighted average return is created for each of these industries.

We also adopt the same approach as JT and MG to calculate monthly returns to the investment strategies. Both JT and MG focus on (6, 6) strategies: Each month investors form a portfolio based on past 6-month returns, and hold the position for 6 months. The differences between the strategies of JT and MG lie in how past performance is measured.

Table I

Profits from Momentum Strategies

This table reports the average monthly portfolio returns from July 1963 through December 2001 for three different momentum investing strategies. Jegadeesh–Titman (JT) and Moskowitz–Grinblatt (MG) portfolios are formed based on past 6-month returns and the 52-week high portfolios are based on the ratio of current price to the highest price achieved within the past 12 months. All portfolios are held for 6 months. The winner (loser) portfolio in JT's strategy is the equally weighted portfolio of 30% of stocks with the highest (lowest) past 6-month return. The winner (loser) portfolio in MG's strategy is the equally weighted portfolio of the top (bottom) 30% of stocks ranked by the value-weighted industry return to which the stock belongs. The winner (loser) portfolio for the 52-week high strategy is the equally weighted portfolio of the 30% of stocks with the highest (lowest) ratio of current price to 52-week high. The sample includes all stocks on CRSP; t-statistics are in parentheses.

	Winner	Loser	Winner − Loser
JT's individual stock momentum	1.53%	1.05%	0.48%
			(2.35)
MG's industrial momentum	1.48%	1.03%	0.45%
			(3.43)
52-week high	1.51%	1.06%	0.45%
			(2.00)

For each stock, MG measures past performance as the value-weighted industry return, over the past 6 months, of the industry to which the stock belongs. At the beginning of each month t, stocks are ranked in ascending order according to their industries' past performance. Based on these rankings, three portfolios are formed. Stocks ranked in the top 30% of industries constitute the winner portfolio, stocks in bottom 30% constitute the loser portfolio, and the remaining stocks constitute the middle portfolio. These portfolios are equally weighted.[2] The strategy is to hold, for 6 months, a self-financing portfolio that is long the winner and short the loser portfolios.[3] In any particular month t of a (6, 6) strategy, the return to winners is calculated as the equally weighted average of the month t returns from six separate winner portfolios, each formed in one of the 6 consecutive prior months $t-6$ to $t-1$. The same is done to compute the month–t return to losers. The month–t return to the overall strategy is the difference between the month–t return to winners and the month$-t$ return to losers.

The monthly returns of JT's (6, 6) strategy and the 52-week high strategy are obtained the same way. The only difference is that stocks are ranked using different measures of past performance than industry return. For JT's strategy, stocks are ranked based on their own individual returns over months $t-6$ to $t-1$. For the 52-week high strategy, stocks are ranked based on $\frac{P_{i,t-1}}{high_{i,t-1}}$, 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 that ends on the last day of month $t-1$.

We focus the early discussion in the paper on (6, 6) strategies because these have been analyzed so extensively in the literature to date. After establishing our main results, we then examine their robustness to (6, 12), (12, 6), and (12, 12) strategies.

II. Results

A. *Profits from (6, 6) Momentum Strategies*

Table I reports average monthly returns of winner, loser, and self-financing portfolios of the three (6, 6) investment strategies described above. The first row is for JT's individual stock momentum strategy, the next is for MG's industrial momentum strategy, and the last is for the 52-week high strategy. The returns to these strategies are very close, all around 0.45% per month.

In Table II, Panel A, we examine the strategies' returns in non-January months. Compared with Table I, the returns of the loser portfolios without January are much smaller for all three strategies. This is because the January

[2] MG uses value-weighted portfolios because it facilitates their calculations of size-adjusted returns. Our use of equally weighted portfolios follows JT.

[3] To abstract from bid-ask bounce, we skip a month between ranking and holding periods in our regression tests. We do not skip a month for the more descriptive Tables I–IV to better compare with numbers reported in existing studies such as JT, so our initial description of methods ignores the skip.

Table II

Profits to Momentum Strategies

This table reports the average monthly portfolio returns from July 1963 through December 2001, excluding Januaries (Panel A) or Januaries only (Panel B), for three different momentum investing strategies. Jegadeesh–Titman (JT) and Moskowitz–Grinblatt (MG) portfolios are formed based on past 6-month returns; the 52-week high portfolios are based on the ratio of current price to the highest price achieved within the past 12 months. All portfolios are held for 6 months. The winner (loser) portfolio in JT's strategy is the equally weighted portfolio of 30% of stocks with the highest (lowest) past 6-month return. The winner (loser) portfolio in MG's strategy is the equally weighted portfolio of the top (bottom) 30% of stocks ranked by the value-weighted industry return to which the stock belongs. The winner (loser) portfolio for the 52-week high strategy is the equally weighted portfolio of the 30% of stocks with the highest (lowest) ratio of current price to the 52-week high. The sample includes all stocks on CRSP; t-statistics are in parentheses.

	Winner	Loser	Winner − Loser
Panel A: January Returns Excluded			
JT's individual stock momentum	1.23%	0.16%	1.07%
			(6.97)
MG's industrial momentum	0.99%	0.50%	0.50%
			(3.92)
52-week high	1.30%	0.07%	1.23%
			(7.06)
Panel B: January Only			
JT's individual stock momentum	4.96%	11.2%	−6.29%
			(−4.48)
MG's industrial momentum	7.00%	7.09%	−0.09%
			(−0.12)
52-week high	3.84%	12.11%	−8.27%
			(−5.49)

rebound for loser stocks is missing when January is excluded.[4] The reductions are larger for the JT and 52-week high momentum strategies than for MG's strategy because the former strategies are based on past performance of the individual stocks.[5] This pattern is apparent in Panel B, which examines returns in January only. The JT and 52-week high strategies earn significantly negative returns, while the return to MG's strategy is near zero in January.

Table II also illustrates that winner industries are not entirely populated by winner stocks. When January is excluded, there are small reductions in returns

[4] Roll (1983), Griffiths and White (1993), and Ferris, D'Mello, and Hwang (2001) argue that the January/turn-of-the-year effect is a consequence of tax loss selling: Investors sell loser stocks to realize tax loss benefits at year end. The selling pressure temporarily depresses the prices of these stocks at year end, but the prices rebound after the new year when the selling pressure vanishes.

[5] This is consistent with the observation in the previous footnote. Tax loss selling is associated with capital losses of individual stocks, not the loss of the industry.

for the winners in the JT and the 52-week high momentum strategies, but the reduction for the winners in the MG industrial portfolios is substantial (from 1.48 to 0.99%). This indicates that there are significant numbers of *individual-stock* losers in MG's winner portfolio whose price increases are missing when January is excluded. This is evident in Panel B; January returns to MG's winners and losers are almost identical. The net result is that the momentum profits for MG change very little when January is excluded, but profits from the JT and 52-week high strategies more than double when the January effect is removed—from 0.48 to 1.07% and from 0.45 to 1.23%, respectively.

B. Dominance of the 52-Week High Momentum Strategy

Tables I and II show that the two strategies based on past performance of individual stocks generate very similar returns. They are not identical, however. A large part of JT's profit is actually attributable to the future returns of stocks whose prices are near or far from their 52-week high. We demonstrate this in two separate tests.

We first conduct *pairwise* nested comparisons of profits from the 52-week high strategy versus the other two strategies. These tests identify whether the JT or MG strategies have explanatory power conditional on the rankings implied by the 52-week high strategy, and vice versa.

As in Tables I and II, we define the winner portfolio to include stocks performing in the top 30%, and the loser portfolio to include the bottom 30%. The remaining 40% is the middle portfolio. The performance ranking is based on $\frac{P_{i,t-1}}{high_{i,t-1}}$ for the 52-week high strategy, individual stock returns over $t-6$ to $t-1$ for JT's strategy, and the industry return over $t-6$ to $t-1$ for MG's strategy.

Panel A of Table III compares the 52-week high strategy against JT's momentum strategy. Stocks are collected into winner, loser, and middle groups using JT's rankings, then each of those groups is further subdivided using the 52-week high performance measure. Within the winner and loser JT groups, the 52-week high strategy still maintains its profitability. A self-financing strategy based on the 52-week high produces monthly returns of 0.46% (1.11%) and 0.56% (0.98%) per month (outside of January) among stocks that have already been classified by JT as winners and losers, respectively. The nesting is reversed in Panel B. Stocks are first grouped using the 52-week high performance measure, then by JT's. Within winners and losers classified using the 52-week high, the profitability of JT's strategy is small at 0.22% (0.29%) or less per month (outside of January) and not statistically significant. These results indicate that extremes of the distribution of the 52-week high performance measure are better than JT's at predicting future returns.

A similar conclusion is implied by the non-January results for the stocks that fall in the middle portfolios. These stocks are those that the first grouping criterion predicts will not have extreme future returns. Thus, if the first criterion is good at prediction, profits should not be available by further subdividing these stocks into subgroups using another criterion. Within the middle portfolio

Table III

Pairwise Comparison of the 52-Week High and Jegadeesh and Titman's Momentum Strategies

Stocks are sorted independently by past 6-month return and by the 52-week high measure. JT winners (losers) are the 30% of stocks with the highest (lowest) past 6-month return. JT middle are stocks that are neither JT winners nor JT losers. The 52-week high winners (losers) are the 30% of stocks that have the highest (lowest) 52-week high measure; the middle group consists of those that are neither winners nor losers. All portfolios are held for 6 months. Panel A reports the average monthly returns from July 1963 through December 2001 for equally weighted portfolios that are long 52-week winners and short 52-week losers *within* winner, middle, and loser categories identified by JT's strategy. Panel B reports returns for equally weighted portfolios formed using JT's strategy *within* groups identified as winner, middle, and loser by the 52-week high strategy. The *t*-statistics are in parentheses.

Panel A

Portfolios Classified by Jegadeesh and Titman's Momentum Strategy	Portfolio Classified by 52-Week High	Ave. Monthly Return	Ave. Monthly Return Excluding January
Winner	Winner	1.63%	1.41%
	Loser	1.17%	0.31%
	Winner − Loser	0.46% (2.15)	1.11% (6.11)
Middle	Winner	1.30%	1.10%
	Loser	1.04%	0.24%
	Winner − Loser	0.26% (1.33)	0.86% (6.28)
Loser	Winner	1.27%	1.04%
	Loser	1.05%	0.01%
	Winner − Loser	0.56% (1.62)	0.98% (3.13)

Panel B

Portfolio Classified by 52-Week High	Portfolios Classified by Jegadeesh and Titman's Momentum Strategy	Ave. Monthly Return	Ave. Monthly Return Excluding January
Winner	Winner	1.63%	1.41%
	Loser	1.27%	1.04%
	Winner − Loser	0.22% (0.68)	0.24% (0.74)
Middle	Winner	1.48%	1.03%
	Loser	1.21%	0.73%
	Winner − Loser	0.27% (2.12)	0.30% (2.35)
Loser	Winner	1.17%	0.31%
	Loser	1.05%	0.01%
	Winner − Loser	0.12% (0.76)	0.29% (1.96)

classified by JT's approach, a 52-week high strategy earns 0.26% (0.86%) per month (excluding January). Within the middle portfolio classified by the 52-week high approach, JT's strategy earns 0.27% (0.30%) per month (excluding January). The magnitudes are small and similar when January is included. However, the former return is almost triple the latter outside of January, though both are statistically significant.

Table IV

Pairwise Comparison of the 52-Week High and Moskowitz and Grinblatt's Momentum Strategies

Stocks are sorted independently by past 6-month industry return and by the 52-week high measure. MG winners (losers) are the 30% of stocks with the highest (lowest) past 6-month industry return. MG middle are stocks that are neither MG winners nor MG losers. The 52-week high winners (losers) are the 30% of stocks that have the highest (lowest) 52-week measure; the middle group consists of those that are neither winners nor losers. All portfolios are held for 6 months. Panel A reports the average monthly returns from July 1963 through December 2001 for equally weighted portfolios that are long 52-week winners and short 52-week losers *within* winner, middle, and loser categories identified by MG's strategy. Panel B reports returns for equally weighted portfolios formed using MG's strategy *within* groups identified as winner, middle, and loser by the 52-week high strategy. The t-statistics are in parentheses.

Panel A

Portfolios Classified by Moskowitz and Grinblatt's Industrial Momentum Strategy	Portfolio Classified by 52-Week High	Ave. Monthly Return	Ave. Monthly Return Excluding January
Winner	Winner	1.67%	1.46%
	Loser	1.42%	0.41%
	Winner − Loser	0.25% (1.14)	1.04% (6.43)
Middle	Winner	1.40%	1.18%
	Loser	1.09%	0.13%
	Winner − Loser	0.32% (1.44)	1.05% (6.18)
Loser	Winner	1.40%	1.19%
	Loser	0.77%	−0.19%
	Winner − Loser	0.62% (2.60)	1.38% (7.83)

Panel B

Portfolios Classified by 52-Week High	Portfolio Classified Moskowitz and Grinblatt's Industrial Momentum Strategy	Ave. Monthly Return	Ave. Monthly Return Excluding January
Winner	Winner	1.67%	1.46%
	Loser	1.40%	1.19%
	Winner − Loser	0.27% (2.60)	0.26% (2.37)
Middle	Winner	1.50%	1.08%
	Loser	1.17%	0.80%
	Winner − Loser	0.32% (3.34)	0.28% (2.71)
Loser	Winner	1.42%	0.41%
	Loser	0.77%	−0.19%
	Winner − Loser	0.64% (4.73)	0.60% (4.48)

We use the same approach to compare the 52-week high and MG's industrial momentum strategies. The results are reported in Table IV. Both of these strategies retain similar profitability within groups sorted on the other strategy when January is included. However, outside of January, when the 52-week high strategy is applied within groups of MG's strategy, profits are two to four times larger than when the reverse is done. These findings are consistent with the notion that the 52-week high performance measure is better than MG's at predicting future returns outside of January. However, the statistical significance of MG's profits within groups formed using the 52-week high performance measure indicates that the two strategies are independent enough and combining them would improve profits from momentum investing.

Our second approach to comparing the strategies is more careful and powerful than the pairwise comparisons.[6] These tests are based on Fama–MacBeth (1973) style cross-sectional regressions, which control for the effects of firm size and bid-ask bounce, and enable us to compare all three strategies simultaneously. The dependent variable in these regressions is the month–t return to stock i, $R_{i,t}$. The independent variables are dummies that indicate whether stock i is held (either long or short) in month t as part of one of the three strategies. We control for market capitalization ($size_{i,t-1}$). We also follow MG by skipping a month between ranking and holding periods, and by including the month $t-1$ return $R_{i,t-1}$ as an independent variable to mitigate the impact of bid-ask bounce on the coefficient estimates. (The results are not sensitive to whether we skip a month and whether $R_{i,t-1}$ is included or not.) Coefficients on the dummies enable us to examine the return to a single strategy in isolation from the other two strategies, while also controlling for size and bid-ask bounce.

As explained earlier, the profit from a winner or loser portfolio in month t for a (6, 6) strategy can be calculated as the sum of returns to six portfolios, each formed in one of the six past successive months $t-j$ (for $j=2$ to $j=7$ to skip a month between formation and holding periods). The contributions of the various portfolios formed in month $t-j$ to the month t return can be obtained by estimating the following regression:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}JH_{i,t-j} + b_{4jt}JL_{i,t-j} + b_{5jt}MH_{i,t-j} + b_{6jt}ML_{i,t-j} + b_{7jt}FHH_{i,t-j} + b_{8jt}FHL_{i,t-j} + e_{it}, \tag{1}$$

where $JH_{i,t-\mathrm{j}}$ equals one if stock i's past performance over the 6-month period $(t-j-6,\ t-j)$ is in the top 30% when measured by JT's performance criterion, and is zero otherwise; $JL_{i,t-\mathrm{j}}$ equals one if stock i's past performance over the period $(t-j-6,\ t-j)$ is in the bottom 30% when measured by JT's performance criterion, and is zero otherwise. The variables *MH* and *ML* (*FHH* and *FHL*) are defined similarly for MG's (the 52-week high) strategy.

According to Fama (1976), the coefficient estimate b_{0jt} can be interpreted as the return to a neutral portfolio that has zeroed (hedged) out the effects of size,

[6] A weakness with the results in Tables III and IV is that the cells are not evenly balanced. For instance, relative to the others, the portfolio of 52-week high winners and JT losers has a small number of stocks in it, and in some months it has none. Both winner and loser portfolios must be nonempty for a month to be included in the winner minus loser cell. This is why, for example, the average in the last row of Panel A is not the difference between the two rows above it. Even if we exclude this portfolio (the last row of Panel A and the first row of Panel B) from our comparison in Table III, we still have reasonable evidence to suggest that the 52-week high strategy dominates. Nevertheless, regression tests do not suffer from potential problems associated with having unbalanced cells.

bid-ask bounce, and momentum identified by all three strategies; and b_{3jt} as the month t return to a zero investment portfolio that is long JT winner stocks but that has also hedged out all other effects. In other words, b_{3jt} can be viewed as the return in excess of b_{0jt} that can be earned by taking a long position in a pure JT winner portfolio.[7] Estimates of the remaining coefficients have similar interpretations.

The returns to (6, 6) strategies involve portfolios formed over 6 of the prior 7 months. For a given strategy, the total return in month t (as a monthly return) of the set of pure winner or pure loser portfolios can be expressed as sums $\frac{1}{6}\sum_{j=2}^{7} b_{3jt}, \ldots, \frac{1}{6}\sum_{j=2}^{7} b_{8jt}$, where the individual coefficients are computed from separate cross-sectional regressions for each $j = 2, \ldots, 7$. The time-series averages of the month-by-month estimates of these sums, and associated t-statistics, are reported in Table V for raw and risk-adjusted returns.[8] The average profit that is related exclusively to each of the different momentum investing strategies can be readily obtained from the figures reported in the table. For instance, the difference between the JT winner and JT loser dummies represents the return from a zero investment portfolio that is long pure JT winners and short pure JT losers.

The top panel of Table V reports the regression results. Profits from the three momentum strategies and significance tests appear in the bottom panel. These results for (6, 6) strategies mirror those of the pairwise comparisons. When data from all months are included, the coefficients on the 52-week high momentum dummies dominate those of JT's and MG's strategies. In raw returns, a self-financing 52-week high momentum strategy yields 0.65% (first row of bottom panel) per month, which is much greater than 0.38% for JT and 0.25% for MG. Outside of January, the 52-week high strategy is even more dominant. The return from the 52-week high strategy is 1.06% per month versus JT's 0.46% and MG's 0.22%.

Dominance of the 52-week high strategy is stronger in risk-adjusted returns than in raw returns. When January is included, the 52-week high strategy earns 0.86%, while JT earns 0.38% and MG earns 0.25% per month. Outside of January, the 52-week high earns 1.13% per month, while JT earns 0.46% and MG earns 0.24%.

Table V also displays results for (6, 12) strategies. These serve as a point of reference for the analysis of reversals in the next subsection. Similar to the (6, 6) strategies, rankings into top and bottom 30% are based on performance over the past 6 months (with a 1-month skip). The difference is that the positions are held for 12 months. Analogous to the discussion above, the month t return to a (6, 12) strategy is the equal-weighted average of the returns from

[7] The weights associated with the pure JT winner portfolio are the entries in the fourth row of the $9 \times n$ matrix $(X'X)^{-1}X'$ where X is the matrix of regressors in equation (1) and n is the number of stocks in the cross-section.

[8] Our risk adjustment is equivalent to hedging out the strategy's Fama–French (1996) factor exposure. For example, the risk-adjusted return of a pure (6, 6) JT winner portfolio is the intercept from a time series regression of $\frac{1}{6}\sum_{j=2}^{7} b_{3jt}$ on the contemporaneous Fama–French factors.

Table V

Comparison of JT, MG, and 52-Week High Strategies

Each month between July 1963 and December 2001, 6 ($j = 2, \ldots, 7$) or 12 ($j = 2, \ldots, 13$) cross-sectional regressions of the following form are estimated for (6, 6) and (6, 12) strategies, respectively:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}JH_{i,t-j} + b_{4jt}JL_{i,t-j} + b_{5jt}MH_{i,t-j} + b_{6jt}ML_{i,t-j} + b_{7jt}FHH_{i,t-j} + b_{8jt}FHL_{i,t-j} + e_{it},$$

where $R_{i,t}$ and $size_{i,t}$ are the return and the market capitalization of stock i in month t; $FHH_{i,t-j}$ ($FHL_{i,t-j}$) is the 52-week high winner (loser) dummy that takes the value of 1 if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. The measures *JH, JL, MH*, and *ML* are defined similarly except that the *JH* (*JL*) indicates a winner (loser) by JT's ranking criterion, and *MH* (*ML*) indicates a winner (loser) by MG's criterion, for the period between months $t-j-6$ and $t-j$. The coefficient estimates of a given independent variable are averaged over $j = 2, \ldots, 7$ for (6, 6) strategies, and $j = 2, \ldots, 13$ for (6, 12) strategies. The numbers reported for the raw return in the tables are the time-series averages of these averages. They are in percent per month. The t-statistics (in parentheses) are calculated from the times series. To obtain risk-adjusted returns, we further run times series regressions of these averages (one for each average) on the contemporaneous Fama–French factor realizations to hedge out the factor exposure. The numbers reported for risk adjusted returns are intercepts from these time-series regressions and their t-statistics are in parentheses.

	Raw Returns Monthly Return from (6, 6) Strategy		Risk-Adjusted Returns Monthly Return from (6, 6) Strategy		Raw Returns Monthly Return from (6, 12) Strategy		Risk-Adjusted Returns Monthly Return from (6, 12) Strategy	
	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.
Intercept	3.62	1.87	2.58	1.55	3.42	1.66	2.38	1.34
	(6.09)	(3.57)	(5.99)	(4.02)	(5.73)	(3.17)	(5.56)	(3.51)
$R_{i,t-1}$	−6.50	−5.53	−5.94	−5.36	−6.56	−5.58	−5.99	−5.41
	(−14.90)	(−14.89)	(−14.17)	(−14.78)	(−14.88)	(−14.96)	(−14.14)	(−14.82)
Size	−0.20	−0.08	−0.17	−0.09	−0.19	−0.06	−0.16	−0.07
	(−4.70)	(−2.13)	(−5.11)	(−3.09)	(−4.27)	(−1.61)	(−4.58)	(−2.44)
JT winner dummy	0.17	0.15	0.16	0.16	0.05	0.02	0.05	0.04
	(2.07)	(1.69)	(2.80)	(2.69)	(0.60)	(0.22)	(1.10)	(0.79)

JT loser dummy	−0.21	−0.31	−0.22	−0.30	−0.19	−0.27	−0.21	−0.28
	(−3.60)	(−6.29)	(−3.85)	(−6.28)	(−4.64)	(−7.58)	(−5.22)	(−7.82)
MG winner dummy	0.18	0.17	0.19	0.19	0.10	0.09	0.14	0.13
	(2.80)	(2.54)	(2.85)	(2.76)	(1.81)	(1.56)	(2.44)	(2.17)
MG loser dummy	−0.07	−0.05	−0.07	−0.05	−0.07	−0.05	−0.09	−0.07
	(−1.14)	(−0.84)	(−1.09)	(−0.85)	(−1.53)	(−1.16)	(−1.98)	(−1.65)
52-week high winner dummy	0.16	0.27	0.27	0.32	0.13	0.22	0.23	0.27
	(3.06)	(5.25)	(6.49)	(7.66)	(2.83)	(5.19)	(6.89)	(8.39)
52-week high loser dummy	−0.48	−0.79	−0.59	−0.81	−0.26	−0.56	−0.37	−0.58
	(−4.07)	(−7.76)	(−6.30)	(−10.65)	(−2.29)	(−5.87)	(−4.22)	(−8.33)
52-week high winner dummy −	0.65	1.06	0.86	1.13	0.39	0.78	0.60	0.85
52-week high loser dummy	(4.08)	(7.64)	(7.29)	(11.35)	(2.63)	(6.14)	(5.61)	(9.73)
JT winner dummy −	0.38	0.46	0.38	0.46	0.24	0.29	0.27	0.32
JT loser dummy	(3.71)	(4.39)	(4.02)	(5.13)	(2.74)	(3.25)	(3.77)	(4.65)
MG winner dummy −	0.25	0.22	0.25	0.24	0.17	0.15	0.22	0.20
MG loser dummy	(2.83)	(2.45)	(2.92)	(2.72)	(2.23)	(1.81)	(3.11)	(2.66)

12 separate portfolios. Accordingly, the estimates reported in the tables are time-series averages of the sums $\frac{1}{12}\sum_{j=2}^{13} b_{0jt}$, $\frac{1}{12}\sum_{j=2}^{13} b_{1jt}, \ldots, \frac{1}{12}\sum_{j=2}^{13} b_{8jt}$.

Results for the (6, 12) strategies are qualitatively the same as those of the (6, 6) strategies. Returns from the 52-week strategy dominate the others in magnitude and statistical significance, especially outside of January, and the dominance is even greater when returns are risk-adjusted. The significance of regression coefficients on the JT and MG dummies is less for (6, 12) than (6, 6) strategies; but in all cases, the coefficients on the 52-week dummies are significant.

The results from the pairwise comparisons and the regressions both indicate that nearness of the current price level to the 52-week high is a better predictor of future returns than are measures of past price changes. This suggests that a theory in which price level relative to an anchor plays a role may be more descriptive of the data than existing theories based on overconfidence, conservatism, or slow diffusion of information that lead to continuations of past returns. This also raises the question of whether the long-term reversals that are built into existing theories should be part of a theory based on an anchor-and-adjust bias. The next subsection addresses whether the future price changes predicted by each strategy are permanent or temporary. Assuming that an anchor is an important component of investor behavior, the answer to the persistence question indicates whether traders over- or underadjust in *correcting* their initial anchoring bias.

C. *Long-Term Reversals*

Next we analyze the extent to which the momentum of stocks with extreme rankings reverses in the long run. The analysis is similar to that in Table V, except that the time gap is larger than one month between when past performance is measured and when the stocks are held. For example, in the regression corresponding to the (6, 12) strategies in Table V, past performance is measured in the 6 month period from 1 to 7 months prior to when the stocks are held (for 12 months). By contrast, the strategy (6, ∼24, 12) selects stocks based on performance over the 6 month period that begins 31 months earlier and ends 25 months earlier (as in Table V, we also skip a month). The (6, 12) strategy is designed to measure returns in the 12-month period immediately after portfolio formation. The (6, ∼24, 12) strategy is designed to measure returns in the 12-month period that begins 24 months after portfolio formation. This allows us to test whether momentum persists, reverses, or disappears 24 months after a stock's past performance ranks in the top or bottom 30%.

Table VI presents regression results for risk-adjusted returns.[9] There is evidence of reversals of prior gains to stocks ranked as winners by JT's and MG's strategies, suggesting that the momentum they identify is a temporary price effect. For example, the coefficient estimates for the (6, ∼12, 12) strategies in

[9] The results using raw returns are similar and available from the authors.

Table VI

Persistence of Profits from JT, MG, and 52-Week High Strategies—Risk-Adjusted Returns

Each month between July 1963 and December 2001, 12 ($j = 2, \ldots, 13$) cross-sectional regressions of the following form are estimated:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}JH_{i,t-k-j} + b_{4jt}JL_{i,t-k-j} + b_{5jt}MH_{i,t-k-j} + b_{6jt}ML_{i,t-k-j} + b_{7jt}FHH_{i,t-k-j} + b_{8jt}FHL_{i,t-k-j} + e_{it},$$

where $R_{i,t}$ and $size_{i,t}$ are the return and the market capitalization of stock i in month t; $FHH_{i,t-k-j}$ ($FHL_{i,t-k-j}$) is the 52-week high winner (loser) dummy that takes the value of 1 if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-k-j$, and zero otherwise. The 52-week high measure in month $t-k-j$ is the ratio of price level in month $t-k-j$ to the maximum price achieved in months $t-k-j-12$ to $t-k-j$. The measures *JH*, *JL*, *MH*,and *ML* are defined similarly except that the *JH* (*JL*) indicates a winner (loser) by JT's ranking criterion, and *MH* (*ML*) indicates a winner (loser) by MG's criterion, for the period between months $t-k-j-6$ and $t-k-j$. The index k determines the time gap across which persistence is measured. In the table, $k = 12, 24, 36, 48$. The coefficient estimates of a given independent variable are averaged over $j = 2, \ldots, 13$. To obtain risk-adjusted returns, we further run time series regressions of these averages (one for each average) on the contemporaneous Fama–French factor realizations to hedge out the factor exposure. The numbers reported in the table are the intercepts from these time-series regressions. They are in percent per month and their t-statistics are in parentheses.

	Monthly Return from (6, ~12, 12) Strategy		Monthly Return from (6, ~24, 12) Strategy		Monthly Return from (6, ~36, 12) Strategy		Monthly Return from (6, ~48, 12) Strategy	
	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl
Intercept	1.73	0.62	1.6	0.5	1.41	0.3	1.28	0.14
	(3.96)	(1.62)	(3.59)	(1.29)	(3.17)	(0.77)	(2.96)	(0.37)
$R_{i,t-1}$	−6.05	−5.41	−6.10	−5.43	−6.16	−5.47	−6.25	−5.57
	(−13.85)	(−14.56)	(−13.86)	(−14.45)	(−13.98)	(−14.27)	(−13.93)	(−14.01)
Size	−0.09	−0.01	−0.08	0.00	−0.07	0.02	−0.05	0.03
	(−2.63)	(−0.17)	(−2.27)	(0.16)	(−2.00)	(0.58)	(−1.56)	(1.20)
JT winner dummy	−0.15	−0.18	−0.08	−0.11	−0.06	−0.10	−0.09	−0.13
	(−3.80)	(−4.76)	(−2.06)	(−2.90)	(−1.54)	(−2.73)	(−2.23)	(−3.36)
JT loser dummy	−0.02	−0.06	−0.02	−0.03	0.00	−0.02	0.02	0.02
	(−0.86)	(−2.26)	(−0.72)	(−1.27)	(−0.08)	(−0.76)	(0.68)	(0.77)
MG winner dummy	−0.11	−0.12	−0.08	−0.09	0.05	0.02	0.06	0.06
	(−2.42)	(−2.76)	(−2.04)	(−2.43)	(1.16)	(0.49)	(1.37)	(1.42)

(continued)

Table VI—*Continued*

	Monthly Return from (6, ∼12, 12) Strategy		Monthly Return from (6, ∼24, 12) Strategy		Monthly Return from (6, ∼36, 12) Strategy		Monthly Return from (6, ∼48, 12) Strategy	
	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl
MG loser dummy	−0.03	−0.01	−0.11	−0.10	0.00	0.00	−0.03	−0.02
	(−0.72)	(−0.21)	(−2.67)	(−2.50)	(0.04)	(0.01)	(−0.75)	(−0.43)
52-week high winner dummy	0.03	0.06	0.02	0.06	0.00	0.01	−0.02	−0.01
	(1.00)	(2.15)	(0.74)	(1.91)	(−0.07)	(0.51)	(−0.70)	(−0.34)
52-week high loser dummy	0.05	−0.10	0.08	−0.03	0.06	−0.03	−0.01	−0.08
	(0.67)	(−1.51)	(1.19)	(−0.42)	(0.99)	(−0.51)	(−0.16)	(−1.62)
52-week high winner dummy –	−0.02	0.16	−0.06	0.08	−0.07	0.04	−0.01	0.07
52- week high loser dummy	(−0.23)	(1.93)	(−0.70)	(1.00)	(−0.82)	(0.60)	(−0.15)	(1.11)
JT winner dummy –	−0.13	−0.12	−0.06	−0.07	−0.05	−0.08	−0.10	−0.14
JT loser dummy	(−2.65)	(−2.66)	(−1.24)	(−1.62)	(−1.29)	(−1.85)	(−2.20)	(−3.16)
MG winner dummy –	−0.08	−0.11	0.02	0.01	0.04	0.02	0.09	0.08
MG loser dummy	(−1.33)	(−1.91)	(0.45)	(0.16)	(0.91)	(0.39)	(1.76)	(1.54)

the top panel indicate that the return to a pure JT winner portfolio is a significant –0.15% per month. Similarly, the corresponding estimate for a pure MG winner portfolio is a significant –0.11% per month. Reversals are asymmetric, however. Stocks identified as losers by these strategies do not experience reversals. The coefficients for losers are mostly insignificant, but in a few cases the losses continue.

The bottom panels of these tables report returns from the strategies. Comparing these figures with those of the (6, 12) JT and MG strategies in the bottom panel of Table V indicates that how much of the initial return to following these strategies reverses in the subsequent months. For example, Table V indicates that for all months, the raw return to a (6, 12) JT strategy is 0.24% per month in the 12 months following portfolio formation. The bottom panel of Table VI indicates that this strategy earns a significant –0.13% per month in the 12 subsequent months.

For the 52-week high strategy there is no evidence of reversals for either winners or losers. The coefficient estimates are all small and generally insignificant. The only exception is that outside of January, the coefficient on the 52-week winner dummy is significantly *positive* for (6, $\sim$12, 12). This means that after adjusting for risk, prices of these winners continue to rise through the second year following the beginning of the holding period. These results indicate that returns predicted by the 52-week high strategy are permanent. If the predictability associated with 52-week high is related to an anchor-and-adjust bias, these findings suggest that traders get it right when they finally do correct the initial bias in how they react to news. They neither over- nor undercorrect, so neither over- nor undercorrection need be a feature of a theory of trader behavior based on an anchor-and-adjust bias.

These results have implications for existing theories of momentum. The theories posit that the biases that generate momentum occur either because of underreaction to news or overreaction to news that confirms prior information. We find that the impact of the bias on returns is most strongly related to nearness of a stock's current price to its 52-week high. However, reversals do not occur for these stocks. Taken together, this suggests that long-term reversals are unrelated to the primary bias that gives rise to short-term predictability. If the two phenomena were linked, reversals should be strongest for stocks exhibiting the strongest biases, i.e., 52-week winners and losers, rather than stocks identified as winners and losers by JT's or MG's criteria. The explanation for long-term reversals appears to lie elsewhere, presenting a new challenge for theorists. Our findings suggest that separate theories of short- and long-term predictability in prices will be more descriptive of the data than a theory in which these phenomena are integrated.

D. Models with Anchors

Our evidence suggests that a model in which agents' valuations depend on nearness of the share price to an anchor will be successful in explaining price dynamics. In the introduction, we mention two such models: Klein (2001) and

Grinblatt and Han (2002) (GH hereafter). In both models, the anchor is the price at which agents acquire shares. However, only Grinblatt and Han's model predicts momentum behavior for stocks whose prices are at or near a long-run high or low price, so we focus our discussion on their model.

The main assumptions in GH are that one class of (irrational) investors dislikes recognizing losses on share trades, and that the demands of fully rational investors are price elastic. This leads to a negative dependence of the irrational agents' demand functions on imbedded capital gains that, in turn, affects market prices. Proposition 4 in their paper predicts that momentum behavior occurs when prices achieve long-run highs and lows. The intuition is as follows. Suppose good news arrives that pushes prices above the price at which irrational agents acquired the shares. The price change will understate the full impact of the news on fundamental value because demand of the irrational agents is lower (selling pressure is greater) than it would be in a rational market. Stocks at or near long-run high prices are likely to have experienced good news and to be trading above acquisition prices. Hence, the current price will not fully reflect the impact of the news on fundamentals. The price will increase further when prices eventually converge to fundamental value, resulting in momentum. On the other hand, the demands and hence prices of stocks that have suffered losses or are near a long-term low are higher than they would be in a rational market. As a result, momentum occurs as their prices continue to decline, eventually converging to fundamental value.

Though our findings are consistent with GH's prediction, the interpretation implied by their model is different from the interpretation offered earlier that the 52-week high price serves as an anchor. In their model, the acquisition price is the anchor, and achieving a 52-week high is a proxy for whether the stock's price is higher than the acquisition price. To discriminate between these interpretations, we include GH's measure of embedded capital gains in our earlier regressions. If the reason for our results is because agents anchor on the acquisition price of their shares, then GH's measure of embedded gain should be effective at predicting momentum behavior, and it should eclipse the 52-week high variables.

The GH measure of embedded capital gain is defined as $g_t = \frac{P_t - R_t}{P_t}$, where R_t is the reference price expressed as

$$R_t = \frac{V_{t-1}(1-V_t)P_{t-1} + V_{t-2}(1-V_{t-1})(1-V_t)P_{t-2} + \cdots + V_{t-60}(1-V_{t-59})\cdots(1-V_t)P_{t-60}}{V_{t-1}(1-V_t) + V_{t-2}(1-V_{t-1})(1-V_t) + \cdots + V_{t-60}(1-V_{t-59})\cdots(1-V_t)}, \quad (2)$$

where P_t is the price at the end of month t, and V_t is turnover in month t, defined as trading volume in shares divided by the number of shares outstanding. The reference price is a weighted average of prices over the past 60 months. The weight on a particular month-end price is the product of that month's turnover and the nonturnover of the following months up to month t. For example, the weight on P_{t-2} is the product of turnover in month $t - 2$ (i.e., V_{t-2}) and the nonturnovers in month $t - 1$ and month t (i.e., $1 - V_{t-1}$ and $1 - V_t$). Turnover V_{t-2} is meant to capture the number of investors who purchase the stock at P_{t-2}, while the nonturnovers $1 - V_{t-1}$ and $1 - V_t$ are meant to capture the number of investors who keep the stock in month $t-1$ and month t, respectively. As a result, $V_{t-2}(1-V_{t-1})(1-V_t)$ would capture the relative importance of investor holdings in the stock purchased at P_{t-2} in month t and still held in month t.

Similar to the way that independent variables are defined for the other strategies in equation (1), we define dummy variables for a strategy designed to exploit the slow adjustment predicted by GH's disposition effect. The variable $GH_{i,t-\mathrm{j}}$ takes the value of one if stock i's embedded capital gain g_{t-j} is in the top 30% and is zero otherwise. Likewise, $GL_{i,t-j}$ takes the value of one if stock i's embedded capital gain g_{t-j} is in the bottom 30% and is zero otherwise.[10]

Table VII is identical to Table V, except that the GH winner and loser dummies are added as explanatory variables. For (6, 6) strategies using raw returns including January, the regression estimates indicate that a self-financing 52-week high strategy yields 0.51% (first row of bottom panel) per month versus an insignificant 0.03% for GH. Monthly returns for JT and MG are 0.30% and 0.20%, respectively. The profits from both the 52-week high and GH strategies are larger outside of January and both are significant. However, the 52-week strategy still dominates at 0.75% per month versus 0.44% for GH. The results are similar using risk-adjusted returns.

Compared to the results in Table V, the presence of GH dummies reduces the returns attributable to all three strategies. Outside of January, GH dominates JT and MG. However, regardless of whether January is excluded or not, returns to the 52-week high strategy dominate those of all the other strategies. For example, with reference to (6, 6) strategies outside of January, a self-financing 52-week high strategy yields 0.75% per month versus 0.29% for JT, 0.16% for MG, and 0.44% for GH. Table VII also presents results for (6, 12) strategies. The results are qualitatively the same as for (6, 6) strategies except that the significance of GH is weaker.

Table VIII examines the persistence of profits from all four strategies with the same procedure used in Table VI. As before, profits to the JT and MG strategies exhibit significant reversals for winners. GH's theory does not predict reversals, and indeed, neither the GH nor the 52-week strategies exhibit reversals. Recalling that both the 52-week high and GH dominate the profits from JT and MG, this finding indicates that the dominant sources of short-term momentum do not lead to long-term reversals, further evidence that the two phenomena are distinct.

Taken together, these results are consistent with GH's disposition hypothesis as playing a partial role in explaining profits from momentum strategies. However, their story does not explain our findings with respect to the dominance of the 52-week high as a predictor of future returns. Even after accounting for GH, the results are still consistent with the hypothesis that the 52-week high is itself an anchor.

Table IX is identical to Table V except that a strategy based on the 52-week *low* is used instead of the 52-week high. The 52-week low is as readily

[10] We have also conducted the analysis using the GH measure defined in terms of weekly data, as in Grinblatt and Han (2002). The results are very similar.

Table VII

Comparison of JT, MG, GH, and 52-Week High Strategies

Each month between July 1963 and December 2001, 6 ($j = 2, \ldots, 7$) or 12 ($j = 2, \ldots, 13$) cross-sectional regressions of the following form are estimated for (6, 6) and (6, 12) strategies, respectively:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}JH_{i,t-j} + b_{4jt}JL_{i,t-j} + b_{5jt}MH_{i,t-j} + b_{6jt}ML_{i,t-j} + b_{7jt}GH_{i,t-j} + b_{8jt}GL_{i,t-j} + b_{9jt}FHH_{i,t-j} + b_{10jt}FHL_{i,t-j} + e_{it},$$

where $R_{i,t}$ and $size_{i,t}$ are the return and the market capitalization of stock i in month t; $FHH_{i,t-j}(FHL_{i,t-j})$ is the 52-week high winner (loser) dummy that takes the value of 1 if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and is zero otherwise. The 52-week high measure in month $t-j$ is the ratio of price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. The measure $GH_{i,t-j}(GL_{i,t-j})$ is the GH winner (loser) dummy that takes the value of 1 if the GH embedded gain as defined in the text for stock i is ranked in the top (bottom) 30% in month $t-j$, and is zero otherwise. GH embedded capital gain at month $t-j$ uses the information of prices and volumes in the past 60 month period beginning in month $t-j$. The measures *JH, JL, MH*, and *ML* are defined similarly except that the *JH* (*JL*) indicates a winner (loser) by JT's ranking criterion, and *MH* (*ML*) indicates a winner (loser) by MG's criterion, for the period between months $t-j-6$ and $t-j$. The coefficient estimates of a given independent variable are averaged over $j = 2, \ldots, 7$ for (6, 6) strategies, and $j = 2, \ldots, 13$ for (6, 12) strategies. The numbers reported for the raw return in the tables are the time-series averages of these averages. They are in percent per month. The t-statistics (in parentheses) are calculated from the times series. To obtain risk-adjusted returns, we further run times series regressions of these averages (one for each average) on the contemporaneous Fama–French factor realizations to hedge out the factor exposure. The numbers reported for risk-adjusted returns are the intercepts from these regressions and their t-statistics are in parentheses.

	Raw Returns Monthly Return from (6, 6) Strategy		Risk-adjusted Returns Monthly Return from (6, 6) Strategy		Raw Returns Monthly Return from (6, 12) Strategy		Risk-adjusted Returns Monthly Return from (6, 12) Strategy	
	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.
Intercept	3.27	1.72	2.23	1.40	3.00	1.41	1.84	1.01
	(5.75)	(3.34)	(5.89)	(3.98)	(5.23)	(2.72)	(4.92)	(2.90)
$R_{i,t-1}$	−7.06	−6.02	−6.46	−5.82	−7.11	−6.06	−6.53	−5.88
	(−16.04)	(−15.59)	(−15.23)	(−15.24)	(−16.04)	(−15.63)	(−15.20)	−(15.22)
Size	−0.17	−0.06	−0.14	−0.07	−0.14	−0.03	−0.10	−0.04
	(−4.16)	(−1.67)	(−4.51)	(−2.52)	(−3.57)	(−0.95)	(−3.47)	(−1.36)

JT winner dummy	0.11	0.06	0.10	0.07	0.02	−0.04	0.04	0.00
	(1.36)	(0.69)	(1.71)	(1.26)	(0.21)	(−0.49)	(0.75)	(0.00)
JT loser dummy	−0.19	−0.24	−0.18	−0.23	−0.17	−0.21	−0.18	−0.22
	(−3.70)	(−5.02)	(−3.42)	(−4.94)	(−4.63)	(−6.00)	(−4.77)	(−6.17)
MG winner dummy	0.13	0.10	0.12	0.11	0.07	0.06	0.09	0.08
	(2.13)	(1.64)	(1.88)	(1.71)	(1.44)	(1.12)	(1.83)	(1.56)
MG loser dummy	−0.07	−0.06	−0.08	−0.07	−0.06	−0.04	−0.09	−0.07
	(−1.19)	(−0.96)	(−1.41)	(−1.12)	(−1.36)	(−0.94)	(−2.06)	(−1.62)
GH winner dummy	0.13	0.25	0.23	0.29	0.07	0.16	0.13	0.19
	(2.35)	(4.73)	(4.22)	(5.71)	(1.21)	(3.22)	(2.64)	(3.87)
GH loser dummy	0.10	−0.19	−0.09	−0.26	0.18	−0.08	0.01	−0.14
	(1.06)	(−2.35)	(−1.07)	(−3.46)	(2.00)	(−1.01)	(0.09)	(−1.97)
52-week high winner dummy	0.09	0.13	0.14	0.16	0.11	0.14	0.15	0.17
	(1.92)	(2.65)	(3.57)	(3.87)	(2.51)	(3.39)	(4.73)	(5.21)
52-week high loser dummy	−0.41	−0.62	−0.44	−0.60	−0.26	−0.47	−0.29	−0.45
	(−4.00)	(−6.85)	(−5.47)	(−9.35)	(−2.72)	(−5.68)	(−4.01)	(−7.82)
52-week high winner dummy –	0.51	0.75	0.58	0.76	0.36	0.61	0.44	0.62
52-week high loser dummy	(3.72)	(6.05)	(5.90)	(9.09)	(2.93)	(5.47)	(5.09)	(8.62)
JT winner dummy –	0.30	0.29	0.27	0.30	0.19	0.18	0.21	0.22
JT loser dummy	(3.14)	(2.97)	(3.10)	(3.45)	(2.37)	(2.12)	(3.17)	(3.18)
MG winner dummy –	0.20	0.16	0.20	0.18	0.13	0.10	0.18	0.15
MG loser dummy	(2.50)	(1.95)	(2.52)	(2.18)	(1.91)	(1.40)	(2.74)	(2.23)
GH winner dummy –	0.03	0.44	0.32	0.55	−0.11	0.24	0.13	0.33
GH loser dummy	(0.27)	(4.09)	(2.88)	(5.62)	(−0.94)	(2.39)	(1.25)	(3.56)

Table VIII

Persistence of Profits from JT, MG, and 52-Week High Strategies—Risk-Adjusted Returns

Each month between July 1963 and December 2001, 12 ($j = 2, \ldots, 13$) cross-sectional regressions of the following form are estimated:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}JH_{i,t-k-j} + b_{4jt}JL_{i,t-k-j} + b_{5jt}MH_{i,t-k-j} + b_{6jt}ML_{i,t-k-j} + b_{7jt}FHH_{i,t-k-j} + b_{8jt}FHL_{i,t-k-j} + e_{it},$$

where $R_{i,t}$ and $size_{i,t}$ are the return and the market capitalization of stock i in month t; $FHH_{i,t-k-j}$ ($FHL_{i,t-k-j}$) is the 52-week high winner (loser) dummy that takes the value of 1 if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-k-j$, and is zero otherwise. The 52-week high measure in month $t-k-j$ is the ratio of price level in month $t-k-j$ to the maximum price achieved in months $t-k-j-12$ to $t-k-j$. The measures *JH, JL, MH*, and *ML* are defined similarly except that the *JH* (*JL*) indicates a winner (loser) by JT's ranking criterion, and *MH* (*ML*) indicates a winner (loser) by MG's criterion, for the period between months $t-k-j-6$ and $t-k-j$. The index k determines the time gap across which persistence is measured. In the table, $k = 12, 24, 36, 48$. The coefficient estimates of a given independent variable are averaged over $j = 2, \ldots, 13$. To obtain risk-adjusted returns, we further run time-series regressions of these averages (one for each average) on the contemporaneous Fama–French factor realizations to hedge out the factor exposure. The numbers reported in the table are the intercepts from these time-series regressions. They are in percent per month and their t-statistics are in parentheses.

	Monthly Return from (6, ∼12, 12) Strategy		Monthly Return from (6, ∼24, 12) Strategy		Monthly Return from (6, ∼36, 12) Strategy		Monthly Return from (6, ∼48, 12) Strategy	
	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.
Intercept	1.31	0.32	1.37	0.34	1.32	0.29	1.33	0.30
	(3.27)	(0.90)	(3.24)	(0.93)	(3.09)	(0.78)	(3.11)	(0.82)
$R_{i,t-1}$	−6.59	−5.83	−6.46	−5.70	−6.29	−5.53	−6.16	−5.41
	(−14.38)	(−14.22)	(−13.46)	(−13.35)	(−12.93)	(−12.62)	(−12.05)	(−11.72)
Size	−0.05	0.03	−0.05	0.03	−0.06	0.02	−0.05	0.02
	(−1.57)	(0.97)	(−1.60)	(0.95)	(−1.70)	(0.83)	(−1.66)	(0.78)
JT winner dummy	−0.10	−0.15	0.00	−0.05	0.00	−0.04	−0.04	−0.09
	(−2.51)	(−3.77)	(−0.07)	(−1.28)	(0.07)	(−1.14)	(−1.03)	(−2.26)
JT loser dummy	−0.03	−0.04	−0.05	−0.06	−0.01	−0.03	0.00	0.00
	(−1.07)	(−1.63)	(−1.82)	(−2.31)	(−0.28)	(−0.97)	(−0.05)	(−0.18)

MG winner dummy	−0.11	−0.11	−0.06	−0.07	0.05	0.02	0.09	0.09
	(−2.45)	(−2.66)	(−1.39)	(−1.79)	(1.21)	(0.46)	(2.08)	(1.98)
MG loser dummy	−0.02	0.01	−0.08	−0.08	−0.01	−0.01	−0.05	−0.05
	(−0.36)	(0.11)	(−1.95)	(−1.83)	(−0.17)	(−0.13)	(−1.12)	(−0.98)
GH winner dummy	−0.03	0.02	−0.10	−0.07	−0.09	−0.06	−0.08	−0.04
	(−0.51)	(0.40)	(−2.03)	(−1.37)	(−1.77)	(−1.17)	(−1.50)	(−0.81)
GH loser dummy	0.03	−0.06	0.00	−0.05	−0.02	−0.03	0.03	0.05
	(0.48)	(−1.04)	(−0.03)	(−0.89)	(−0.30)	(−0.54)	(0.54)	(0.81)
52-week high winner dummy	0.04	0.05	0.05	0.07	0.03	0.03	0.02	0.02
	(1.41)	(1.80)	(1.78)	(2.40)	(1.04)	(1.16)	(0.72)	(0.61)
52-week high loser dummy	0.01	−0.11	0.01	−0.11	0.05	−0.06	−0.02	−0.10
	(0.21)	(−2.03)	(0.08)	(−1.94)	(0.71)	(−0.94)	(−0.25)	(−1.93)
52-week high winner dummy –	0.02	0.16	0.04	0.18	−0.02	0.09	0.04	0.12
52-week high loser dummy	(0.30)	(2.34)	(0.57)	(2.58)	(−0.25)	(1.26)	(0.48)	(1.79)
JT winner dummy –	−0.08	−0.11	0.05	0.01	0.01	−0.02	−0.04	−0.09
JT loser dummy	(−1.46)	(−2.14)	(0.97)	(0.29)	(0.22)	(−0.41)	(−0.79)	(−1.65)
MG winner dummy –	−0.09	−0.12	0.03	0.01	0.06	0.03	0.14	0.14
MG loser dummy	(−1.62)	(−2.17)	(0.46)	(0.13)	(1.12)	(0.48)	(2.58)	(2.39)
GH winner dummy –	−0.06	0.09	−0.10	−0.01	−0.07	−0.03	−0.11	−0.09
GH loser dummy	(−0.62)	(0.96)	(−1.12)	(−0.14)	(−0.89)	(−0.33)	(−1.31)	(−1.07)

Table IX
Comparison of JT, MG, and 52-Week Low Strategies

Each month between July 1963 and December 2001, 6 ($j = 2, \ldots, 7$) or 12 ($j = 2, \ldots, 13$) cross-sectional regressions of the following form are estimated for (6, 6) and (6, 12) strategies, respectively:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}JH_{i,t-j} + b_{4jt}JL_{i,t-j} + b_{5jt}MH_{i,t-j} + b_{6jt}ML_{i,t-j} + b_{7jt}FLH_{i,t-j} + b_{8jt}FLL_{i,t-j} + e_{it},$$

where $R_{i,t}$ and $size_{i,t}$ are the return and the market capitalization of stock i in month t; $FLH_{i,t-j}$($FLL_{i,t-j}$) is the 52-week low winner (loser) dummy that takes the value of 1 if the 52-week low measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and is zero otherwise. The 52-week low measure in month $t-j$ is the ratio of price level in month $t-j$ to the minimum price achieved in months $t-j-12$ to $t-j$. The measures *JH*, *JL*, *MH*, and *ML* are defined similarly except that the *JH* (*JL*) indicates a winner (loser) by JT's ranking criterion, and *MH* (*ML*) indicates a winner (loser) by MG's criterion, for the period between months $t-j-6$ and $t-j$. The coefficient estimates of a given independent variable are averaged over $j = 2, \ldots, 7$ for (6, 6) strategies, and $j = 2, \ldots, 13$ for (6, 12) strategies. The numbers reported for the raw return in the tables are the time-series averages of these averages. They are in percent per month. The t-statistics (in parentheses) are calculated from the times series. To obtain risk-adjusted returns, we further run times series regressions of these averages (one for each average) on the contemporaneous Fama–French factor realizations to hedge out the factor exposure. The numbers reported for risk-adjusted returns are intercepts from these time-series regressions and their t-statistics are in parentheses.

	Raw Returns Monthly Return from (6, 6) Strategy		Risk-Adjusted Returns Monthly Return from (6, 6) Strategy		Raw Returns Monthly Return from (6, 12) Strategy		Risk-Adjusted Returns Monthly Return from (6, 12) Strategy	
	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.
Intercept	3.27	1.36	2.16	1.01	3.26	1.34	2.15	0.99
	(5.18)	(2.48)	(4.76)	(2.55)	(5.14)	(2.43)	(4.74)	(2.51)
$R_{i,t-1}$	−6.50	−5.50	−5.93	−5.34	−6.56	−5.57	−5.98	−5.39
	(−14.82)	−(14.96)	(−14.09)	(−14.86)	(−14.86)	(−15.09)	(−14.10)	(−14.93)
Size	−0.18	−0.04	−0.14	−0.05	−0.17	−0.03	−0.13	−0.04
	(−3.86)	(−1.00)	(−3.90)	(−1.60)	(3.68)	(−0.79)	(−3.70)	(−1.34)
JT winner dummy	0.25	0.30	0.30	0.33	0.13	0.20	0.20	0.23
	(5.18)	(6.38)	(6.35)	(6.82)	(3.50)	(5.65)	(5.75)	(6.73)

JT loser dummy	−0.46	−0.75	−0.57	−0.77	−0.32	−0.59	−0.44	−0.63
	(−3.63)	(−6.92)	(−5.75)	(−9.75)	(−2.91)	(−6.16)	(−5.33)	(−9.30)
MG winner dummy	0.17	0.16	0.17	0.18	0.10	0.09	0.13	0.12
	(2.69)	(2.44)	(2.75)	(2.67)	(1.73)	(1.48)	(2.38)	(2.09)
MG loser dummy	−0.07	−0.05	−0.07	−0.05	−0.07	−0.05	−0.08	−0.07
	(−1.08)	(−0.82)	(−1.03)	(−0.79)	(−1.56)	(−1.19)	(−1.95)	(−1.59)
52-week low winner dummy	0.06	0.02	0.07	0.05	−0.04	−0.10	−0.04	−0.07
	(0.61)	(0.21)	(1.30)	(0.95)	(−0.45)	(−1.04)	(−0.77)	(−1.43)
52-week low loser dummy	−0.07	−0.09	−0.01	−0.06	−0.10	−0.11	−0.05	−0.08
	(−1.37)	(−1.98)	(−0.32)	(−1.64)	(−2.26)	(−2.48)	(−1.42)	(−2.53)
52-week low winner dummy −	0.13	0.12	0.09	0.11	0.06	0.01	0.01	0.01
52-week low loser dummy	(0.95)	(0.84)	(1.05)	(1.47)	(0.45)	(0.06)	(0.12)	(0.14)
JT winner dummy −	0.71	1.05	0.87	1.10	0.45	0.79	0.64	0.86
JT loser dummy	(4.61)	(7.91)	(6.84)	(10.06)	(3.48)	(7.07)	(6.29)	(9.92)
MG winner dummy −	0.24	0.21	0.24	0.22	0.17	0.14	0.22	0.19
MG loser dummy	(2.74)	(2.40)	(2.80)	(2.63)	(2.23)	(1.81)	(3.08)	(2.60)

available a statistic as the 52-week high, and could also serves as an anchor in how investors form beliefs about value. This also provides a further check on GH's hypothesis. Their Proposition 4 applies symmetrically to low as well as to high prices. Therefore, if GH's theory is correct, a strategy based on the 52-week low should be profitable.

The results indicate that a strategy based on the 52-week low is not profitable. Some of the regression coefficients on the 52-week low loser dummy are significant in the upper panel, but they pale by comparison to those of the JT strategy. More importantly, none of the returns to the 52-week low strategy reported in the bottom panel are significant. The JT and MG strategies earn significant profits. For (6, 6) strategies in raw returns, JT and MG earn 0.71 and 0.24% per month, both significant, while the 52-week low strategy earns an insignificant 0.13%. This is in sharp contrast to the profits reported in Table V. The 52-week *high* strategy's return is a significant 0.65% and dominates the 0.38% of JT and the 0.25% of MG.

We do not have an explanation grounded in experimental studies that indicates why investors should favor a stock's 52-week high as an anchor over its 52-week low. Coefficients on the 52-week low loser dummy appear consistent with anchoring behavior, albeit weaker than 52-week high, but those for the 52-week low winner dummy do not. A possible explanation for this is that both the 52-week high and low do serve as anchors, but taxes distort the effect for the 52-week low. The 52-week low winner dummy has a unique feature that is not shared by the 52-week high winner—it identifies those stocks with the largest potential short-term capital gains. Locked-in capital gains, particularly those of a short-term nature, decrease investors' willingness to sell a stock (see, for example, Klein (2001)). Consequently, prices of stocks that are winners relative to the 52-week low may tend to be above their fundamental values. When this pricing error is corrected, the reversal might offset whatever momentum is associated with investors having used the 52-week low as an anchor.

E. Robustness

Our focus so far on (6, 6) strategies is motivated by the attention they have received in the existing literature. However, by definition the 52-week high strategy looks back 12 months. In this subsection, we discuss the results of comparing (6, 6) to (12, 6) and (12, 12) versions of the JT and MG strategies to examine whether the length of the "look back" contributes to the dominance of the 52-week high strategy documented in Table V. We find that the 52-week high strategy dominates the returns from these strategies as well. We also examine how our results change when returns are adjusted for risk dynamically as in Grundy and Martin (2001). We find that using this benchmark, the returns and dominance of the 52-week high strategy are very similar to those in Table V. Tables are excluded for brevity and are available from the authors.

The first set of tests estimates Fama–MacBeth regressions comparing returns to the 52-week high strategy to (12, 6) and (12, 12) versions of JT and MG. The results are generally stronger than those in Table V in support of the contention that the 52-week high strategy dominates the others. Profits of the (12, .) JT and MG strategies are less than in Table V and are often insignificant. Those of the 52-week high strategy are similar to those in Table V. In particular, for (12, 12) strategies, the 52-week winner and loser dummies are uniformly significant. JT and MG dummies are mostly insignificant. This means that in forecasting returns 12 months ahead, JT and MG's strategies lose their power. The 52-week high strategy retains its power to forecast, however. This indicates that our earlier comparisons using (6, 6) strategies cast JT and MG in more favorable light relative to the 52-week high strategy. These results are also consistent with our earlier finding that returns predicted by JT and MG are temporary, while those predicted by the 52-week high strategy are permanent.

We also estimated regressions where the GH strategy is based on an embedded gain measure defined over only the last 12 months rather than the last 60 months as above. This strains the disposition hypothesis, because with only a 12-month look back, gains are taxable at ordinary income rates and losses are short term. This should weaken or even reverse the preference of investors to recognize gains over losses, as predicted by the disposition effect. Nevertheless, the results are similar to before, except that the extent to which the 52-week high profits dominate those of 12-month GH is less than with the 60-month GH measure. This is because its dummies are very highly correlated with the 52-week dummies (for example, the correlation between the 52-week high loser dummy and the 12-month GH loser dummy is 0.75, while the same correlation with 60-month loser dummy is 0.57). Both the 52-week high and GH dominate profits to 12-month JT and MG as before. For example, with a 12-month GH, risk-adjusted profits outside of January from the 52-week high strategy are 0.82%, and the 12-month GH are 0.50%, while returns to the (12, 6) version of JT and MG are 0.37 and 0.24% (all are significant). Risk-adjusted profits from the (12, 12) versions of JT and MG are smaller and insignificant.

We also analyze persistence as in Table VI, except that the JT and MG strategies employ 12-month portfolio formation periods. As before, all evidence of reversals pertains to JT and MG, and there are no reversals in connection with the 52-week strategies. Evidence for reversals is stronger in significance for (12, .) strategies than (6, .) strategies. Also, similar to the results for (6, .) strategies, there is some evidence that 52-week winners exhibit continuations beyond the 12-month horizon. The 52-week winner dummy is significantly positive for (12, ∼12, 12) risk-adjusted returns, meaning that returns are significantly positive 24 months after portfolios are formed.

Factor risk exposures to all the strategies we examine might change through time; but so far, our risk-adjusted returns are computed using unconditional betas. To account for this, Grundy and Martin (2001) suggest a technique that uses dynamically updated beta estimates. The betas used in the factor model that adjusts the return for a given month are estimated from a time-series regression of the portfolio's returns on the factors over the portfolio's 6-month holding period (see Grundy and Martin (2001), p. 50). Table X compares the results using this metric with those reported in Table V. Risk-adjusted returns from

Table X

Comparison of JT, MG, and 52-Week High Strategies with Dynamic Risk Adjustment

Each month between July 1963 and December 2001, 6 ($j = 2, \ldots, 7$) or 12 ($j = 2, \ldots, 13$) cross-sectional regressions of the following form are estimated for (6, 6) and (6, 12) strategies, respectively:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}size_{i,t-1} + b_{3jt}JH_{i,t-j} + b_{4jt}JL_{i,t-j} + b_{5jt}MH_{i,t-j} + b_{6jt}ML_{i,t-j} + b_{7jt}FHH_{i,t-j} + b_{8jt}FHL_{i,t-j} + e_{it},$$

where $R_{i,t}$ and $size_{i,t}$ are the return and the market capitalization of stock i in month t; $FH_{i,t-j}(FL_{i,t-j})$ is the 52-week high winner (loser) dummy that takes the value of 1 if the 52-week high measure for stock i is ranked in the top (bottom) 30% in month $t-j$, and is zero otherwise. The 52-week high measure in month $t-j$ is the ratio of price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. The measures *JH, JL, MH*, and *ML* are defined similarly except that the *JH* (*JL*) indicates a winner (loser) by JT's ranking criterion, and *MH* (*ML*) indicates a winner (loser) by MG's criterion, for the period between months $t-j-6$ and $t-j$. The coefficient estimates of a given independent variable are averaged over $j = 2, \ldots, 7$ for (6, 6) strategies, and $j = 2, \ldots, 13$ for (6, 12) strategies. To obtain risk-adjusted returns, we further run times series regressions of these averages (one for each average) on the contemporaneous Fama–French factor realizations to hedge out the factor exposure. The numbers reported for risk-adjusted returns are intercepts from these time-series regressions and their t-statistics are in parentheses. To obtain the dynamic risk-adjusted return in month t, we first estimate the factor loadings using the 6-month time series of these averages and factor realizations from month t to $t+5$. The dynamic risk-adjusted return in month t is the difference between the portfolio return in month t and the return predicted by these factor loadings estimates and the time $-t$ factor realizations. Figures reported in the table are time-series averages of these monthly dynamic risk-adjusted returns.

	Dynamic Risk-Adjusted Monthly Return from (6, 6) Strategy		Risk-Adjusted Monthly Return from (6, 6) Strategy		Dynamic Risk-Adjusted Monthly Return from (6, 12) Strategy		Risk-Adjusted Monthly Return from (6, 12) Strategy	
	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.	Jan. Incl.	Jan. Excl.
Intercept	2.74	2.25	2.58	1.55	2.57	2.08	2.38	1.34
	(5.67)	(4.51)	(5.99)	(4.02)	(5.45)	(4.28)	(5.56)	(3.51)
$R_{i,t-1}$	−6.48	−6.37	−5.94	−5.36	−6.65	−6.53	−5.99	−5.41
	(−16.71)	(−15.87)	(−14.17)	(−14.78)	(−17.49)	(−16.71)	(−14.14)	(−14.82)
Size	−0.16	−0.12	−0.17	−0.09	−0.15	−0.11	−0.16	−0.07
	(−3.92)	(−2.83)	(−5.11)	(−3.09)	(−3.66)	(−2.57)	(−4.58)	(−2.44)

JT winner dummy	−0.03	−0.06	0.16	0.16	−0.10	−0.11	0.05	0.04
	(−0.58)	(−1.04)	(2.80)	(2.69)	(−2.37)	(−2.72)	(1.10)	(0.79)
JT loser dummy	−0.19	−0.21	−0.22	−0.30	−0.21	−0.24	−0.21	−0.28
	(−4.34)	(−4.66)	(−3.85)	(−6.28)	(−6.31)	(−7.04)	(−5.22)	(−7.82)
MG winner dummy	0.13	0.11	0.19	0.19	0.08	0.05	0.14	0.13
	(2.40)	(1.94)	(2.85)	(2.76)	(1.98)	(1.37)	(2.44)	(2.17)
MG loser dummy	−0.16	−0.15	−0.07	−0.05	−0.11	−0.10	−0.09	−0.07
	(−2.80)	(−2.53)	(−1.09)	(−0.85)	(−2.67)	(−2.39)	(−1.98)	(−1.65)
52-week high winner dummy	0.23	0.24	0.27	0.32	0.21	0.22	0.23	0.27
	(6.61)	(6.90)	(6.49)	(7.66)	(8.26)	(8.32)	(6.89)	(8.39)
52-week high loser dummy	−0.69	−0.79	−0.59	−0.81	−0.51	−0.61	−0.37	−0.58
	(−8.84)	(−10.27)	(−6.30)	(−10.65)	(−6.71)	(−8.15)	(−4.22)	(−8.33)
52-week high winner dummy –	0.92	1.04	0.86	1.13	0.71	0.83	0.60	0.85
52-week high loser dummy	(9.92)	(11.28)	(7.29)	(11.35)	(8.09)	(9.38)	(5.61)	(9.73)
JT winner dummy –	0.16	0.16	0.38	0.46	0.11	0.12	0.27	0.32
JT loser dummy	(2.06)	(1.87)	(4.02)	(5.13)	(1.99)	(2.04)	(3.77)	(4.65)
MG winner dummy –	0.30	0.26	0.25	0.24	0.18	0.15	0.22	0.20
MG loser dummy	(3.89)	(3.36)	(2.92)	(2.72)	(3.52)	(2.91)	(3.11)	(2.66)

Table V are reproduced for convenience. The results using both benchmarks are very similar.

III. Conclusion

We compare returns to three momentum investment strategies. The first strategy measures the past return performance of individual stocks and takes a long (short) position in the 30% of top (bottom) performing stocks. This strategy was proposed by Jegadeesh and Titman (1993). The second strategy measures performance using past industry returns and takes a long (short) position in stocks within the 30% of top (bottom) performing industries. This strategy is advocated by Moskowitz and Grinblatt (1999). The third strategy, which is unique to this study, measures performance of individual stocks by reference to how close the current price is to the 52-week high. Long (short) positions are taken in stocks whose current price is close to (far from) the 52-week high.

After controlling for the size effect and the impact of bid-ask bounce, returns associated with winners and losers identified by the 52-week high strategy are about twice as large as those associated with the other strategies. The difference is even larger outside of January. These findings are remarkable because the 52-week high and low prices are among the information that is most readily available to investors. Virtually every newspaper that publishes stock prices also identifies those that hit 52-week highs and lows.

Like the results of Jegadeesh and Titman (1993), these findings present a serious challenge to the view that markets are semistrong-form efficient. The nearness of a stock's price to its 52-week high is public information. The more interesting finding, however, is that nearness to the 52-week high is a much better predictor of future returns than past returns to individual stocks. Jegadeesh and Titman's finding that past returns predict future returns has spawned a theoretical literature that attempts to explain it. Our results suggest that the theories need further refinement.

Existing theories of momentum posit that when information arrives, traders are reluctant or slow to revise their prior beliefs about the security's value, and that when priors are revised, they overadjust (see Barberis, Shleifer, and Vishny (1998), and Hong and Stein (1999)); or, alternatively, that traders overreact to news when subsequent news confirms it, which is corrected in the long run (see Daniel, Hirshleifer, and Subrahmanyam (1998)). The connection between the theories and Jegadeesh and Titman's findings is that an extreme past return serves as an indicator that new information has arrived. The way in which beliefs are updated causes price momentum and reversals.

Our results indicate that the 52-week measure has predictive power *whether or not* individual stocks have had extreme past returns. This suggests that price *level* is important, and is consistent with an anchor-and-adjust bias. Traders appear to use the 52-week high as a reference point against which they evaluate the potential impact of news. When good news has pushed a stock's price near or to a new 52-week high, traders are reluctant to bid the price of the stock higher even if the information warrants it. The information eventually prevails and the price moves up, resulting in a continuation. Similarly, when bad news pushes a stock's price far from its 52-week high, traders are initially unwilling to sell the stock at prices that are as low as the information implies. The information eventually prevails and the price falls. In this respect, traders' reluctance to revise their priors is price-level dependent. The greatest reluctance is at price levels nearest and farthest from the stock's 52-week high. At prices that are neither near nor far from the 52-week high, priors adjust more quickly and there is no pronounced predictability when information arrives.

Grinblatt and Han (2002) use an approach based on anchoring to model momentum in stock returns. We find that their ranking criterion predicts significant returns that do not reverse. However, like returns from the individual and industry momentum strategies, returns from the 52-week high strategy dominate.

We also examine whether long-term reversals occur when past performance is measured based on nearness to the 52-week high. They do not. This finding, coupled with those described above, suggest that short-term momentum and long-term reversals are not likely to be components of the same phenomenon. Separate theories of short- and long-term predictability in prices may be more descriptive than a theory that integrates both phenomena into a life cycle of the market's response to news.

REFERENCES

Barberis, Nicholas, Andrei Shleifer, and Robert Vishny, 1998, A model of investor sentiment, *Journal of Financial Economics* 49, 307–343.

Daniel, Kent, David Hirshleifer, and Avanidhar Subrahmanyam, 1998, Investors, psychology and security market under- and overreactions, *Journal of Finance* 53, 1839–1885.

DeBondt, Werner, and Richard Thaler, 1985, Does the stock market overreact? *Journal of Finance* 40, 793–805.

Fama, Eugene, 1976, *Foundations of Finance: Portfolio Decisions and Securities Prices* (Basic Books Inc., New York).

Fama, Eugene, and Kenneth French, 1996, Multifactor explanation of asset pricing anomalies, *Journal of Finance* 51, 55–84.

Fama, Eugene, and James MacBeth, 1973, Risk, return and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607–636.

Ferris, Steve, Ranjan D'Mello, and Chuan-Yang Hwang, 2001, The tax-loss selling hypothesis, market liquidity, and price pressure around the turn-of-the-year, *Journal of Financial Markets* 6, 73–98.

Ginsburgh, Victor, and Jan van Ours, 2003, Expert opinion and compensation: Evidence from a musical competition, *American Economic Review* 93, 289–296.

Griffiths, Mark, and Robert White, 1993, Tax induced trading and the turn-of-the-year anomaly: An intraday study, *Journal of Finance* 48, 575–598.

Grinblatt, Mark, and Bing Han, 2002, The disposition effect and momentum, Working paper, UCLA.

Grinblatt, Mark, and Matti Keloharju, 2001, What makes investors trade? *Journal of Finance* 51, 589–616.

Grundy, Bruce, and J. Spencer Martin, 2001, Understanding the nature of the risks and the source of the rewards to momentum investing, *Review of Financial Studies* 14, 29–78.

Hong, Harrison, and Jeremy Stein, 1999, A unified theory of underreaction, momentum trading and overreaction in asset markets, *Journal of Finance* 54, 2143–2184.

Jegadeesh, Narasimhan, and Sheridan Titman, 1993, Returns to buying winners and selling losers: Implications for market efficiency, *Journal of Finance* 48, 65–91.

Jegadeesh, Narasimhan, and Sheridan Titman, 2001, Profitability of momentum strategies: An evaluation of alternative explanations, *Journal of Finance* 56, 699–718.

Kahneman, Daniel, Paul Slovic, and Amos Tversky, 1982, *Judgment under Uncertainty: Heuristics and Biases* (Cambridge University Press, New York).

Klein, Peter, 2001, The capital gain lock-in effect and long-horizon return reversal, *Journal of Financial Economic* 59, 33–62.

Lee, Charles M.C., and Bhaskaran Swaminathan, 2000, Price momentum and trading volume, *Journal of Finance* 55, 2017–2069.

Moskowitz, Tobias, and Mark Grinblatt, 1999, Do industries explain momentum? *Journal of Finance* 54, 1249–1290.

Roll, Richard, 1983, Vas ist das? The turn-of-the-year effect and the return premium of small firms, *Journal of Portfolio Management* 9, 18–28.