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Jared Egginton
Boise State University

Jungshik Hur
Louisiana Tech University

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The Robust "Maximum Daily Return Effect as Demand for Lottery" and "Idiosyncratic Volatility Puzzle"

Jared Egginton[1]

and

Jungshik Hur[2]

Abstract

We form indexes of overpriced and underpriced stocks by ranking stocks based on the disposition effect and anchoring bias. We document the negative relation between maximum daily return and future returns (MAX effect) is confined to overpriced stocks which make up about half the entire sample. We find that the average cross-sectional correlation between maximum daily return and idiosyncratic volatility is nearly 90%. Consistent with prior studies the idiosyncratic volatility puzzle disappears after controlling for the MAX effect. However, when using a sample with a $5 price breakpoint and controlling for overpriced stocks the idiosyncratic volatility puzzle and the MAX effect are economically and statistically significant.

[1] Boise State University, Department of Finance Boise, ID 83725. phone: (208) 426-4586, email; jaredegginton@boisestate.edu

[2] Corresponding Author. Louisiana Tech University, Department of Economics and Finance Ruston, LA 71272. phone: (540) 818-3579, email; jhur@latech.edu

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Abstract

We form indexes of overpriced and underpriced stocks by ranking stocks based on the disposition effect and anchoring bias. We document the negative relation between maximum daily return and future returns (MAX effect) is confined to overpriced stocks which make up about half the entire sample. We find that the average cross-sectional correlation between maximum daily return and idiosyncratic volatility is nearly 90%. Consistent with prior studies the idiosyncratic volatility puzzle disappears after controlling for the MAX effect. However, when using a sample with a $5 price breakpoint and controlling for overpriced stocks the idiosyncratic volatility puzzle and the MAX effect are economically and statistically significant.

I. Introduction

Bali, Cakici and Whitelaw (2011) document a new anomaly (the "MAX effect") that long high MAX stocks and short low MAX stocks produces statistically significant value and equal weighted average return of about -1.03% and -0.66% per month respectively, and the corresponding four factor alphas are negative and statistically significant. Bali, et al. interpret that the "MAX effect" is driven by investors' preference of stocks with high MAX as lotteries. Investors are willing to pay more for stocks with extreme positive returns, causing those stocks to be overpriced. Bali, Brown, Murray, and Tang (2014) confirm the "MAX effect" as a preference of lotteries.

Kahneman and Tversky's (1979) prospect theory model of decision making under uncertainty postulates an S-shaped utility function that is concave in the domain of gains but convex in the domain of losses. Thus, investors with the S-shaped utility function are risk averse over positive prospects, but risk loving over negative prospects. Mental accounting (Thaler (1980)) posits that investors tend to set different reference points for each investment that determine gains and losses. The disposition effect documented by Shefrin and Statman (1985) occurs because prospect theory/mental accounting (PT/MA) investors sell their winning stocks too quickly and hold on to their losing stocks too long, resulting in overpricing (underpricing) of stocks with negative (positive) capital gains overhang (Grinblatt and Han (2005) and Frazzini (2006)).

Tversky and Khaneman (1974) report that individuals tend to form numerical estimates through adjustment from an initial (available yet potentially irrelevant) value known as the "anchor".[3] Building on this evidence on anchoring bias, George and Hwang (2004) demonstrate that traders do anchor on the 52-week high price when evaluating the potential impact of news. They find that stocks for which bad news recently reached the market are overpriced because traders are unwilling or unable to sell those stocks whereas stocks for which good news recently arrived are underpriced because traders are reluctant to bid the price of those stocks higher.

We explore the relation between the stock mispricing that occurs due to capital gains overhang and 52-week high anchoring bias, and the MAX effect. Utilizing a method similar to Stambaugh, Yu, and Yuan (2015) we create a composite mispricing index using capital gains overhang (CGO) and the George and Hwang ratio (GH). We form two portfolios based on high and low index values. Stocks with low index values (INDEX1) tend to be overpriced while stocks with higher index values (INDEX2) tend to be underpriced. Using the mispricing index we find that the tendency for stocks with high maximum daily return in the previous month to have low returns in the current month (the "MAX effect") is isolated to overpriced stocks. There is no evidence of the "MAX effect" for underpriced stocks which account for about half the entire sample. The findings suggests that the tendency for investors to pay more for stocks with extreme positive returns (Bali et al 2011) is more prevalent for stocks that have negative capital gains overhang and are far from there 52 week high (overpriced stocks).

We also explore the relation between the MAX effect, the idiosyncratic volatility (IVOL) puzzle, short-term reversal (REV) (Jegahdeesh (1990)) and stock mispricing. We first document that the MAX, the IVOL, and the REV are highly positively correlated one another. The average cross-sectional correlation is 90% between the MAX and the IVOL, 35% between the MAX and

[3] Several other studies document the robustness of this cognitive predisposition. Among others are Russo and Schoemaker (1989), Qu, Zhou and Luo (2008), Brewer, Chapman, Schartz and Bergus (2007).

the REV, and 16% between the IVOL and the REV. Bali, Cakici and Whitelaw (2011) demonstrate that after controlling for MAX the puzzling negative relation between idiosyncratic volatility and future returns (the IVOL puzzle) disappears.[4] Bali and Cakici (2008) documents without a $5 price restriction in their sample that IVOL puzzle only exists in terms of value-weighted portfolio returns and disappears with equal-weighted returns. We confirm the findings of Bali and Cakici (2008) and Bali, Cakici, and Whitelaw (2011) using a sample of stocks without a $5 price restriction. However, we observe evidence of the IVOL puzzle using both value and equal-weighted returns when using a sample with a $5 price restriction. Also when using a $5 price restriction and overpriced stocks, we document that the MAX puzzle and the IVOL puzzle are significant economically and statistically and this finding is robust to other firm characteristics. Finally, we show the MAX effect is persistent for up to four months for overpriced stocks.

The paper is organized as follows. Section II describes the data and variable definitions. Section III discusses the empirical finding of the study, and section IV concludes.

II. Data and Definitions of Variables

II. A. Sample

The dataset includes all common stocks (share code 10 or 11) traded on NYSE, AMEX, and NASDAQ over the sample period from January 1965 to December 2013. We obtain monthly and daily returns, prices and shares outstanding from the Center for Research in Security Prices (CRSP), book value data from the Standard and Poor's COMPUSTAT, and monthly risk-free rate and Fama-French factors (market, size, and book-to-market) and momentum factor from Kenneth

[4] Ang, Hodrick, Xing, and Zhang (2006, 2009) document the IVOL puzzle.

French's website.[5] We follow Brandt et al. (2010) to exclude stocks that have fewer than twelve daily observations in any given month to reduce the noise related to the computation of idiosyncratic volatility.[6]

II. B. George and Hwang Ratio

We follow George and Hwang (2004) to compute the measure of nearness to the 52-week high price (GH hereafter) for each firm at the end of each month t:

$$GH = \frac{Current\ Stock\ Price}{52\text{−}Week\ High\ Price} \tag{1}$$

The higher values of GH measure suggest that current price is closer to the 52-week high price. The GH reaches its maximum value of 1 if a stock's current month end price is the 52-week high price. We adjust the stock price for stock splits and dividends using the CRSP price adjustment factor. As suggested in George and Hwang (2004), stocks with high (low) GH are those for which good (bad) news recently arrived in the market. George and Hwang (2004) demonstrate to explain momentum that traders anchor on the 52-week high price when evaluating the potential impact of news.[7] They show that stocks with high GH are underpriced because traders are unwilling to bid up the price of those stocks whereas stocks with low GH are overpriced because traders are reluctant to or unable to sell those stocks.[8]

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[5] This data are obtained from Kenneth French website http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[6] We find consistent results without this restriction of at least 12 daily observations in any given month.

[7] George and Hwang (2004) show that when firms are sorted into decile portfolios based on GH, the firms in the highest decile significantly outperform the firms in the lowest decile over the subsequent 6 to 12 month period. Importantly, they attribute this finding to an "adjustment and anchoring" bias (Tversky and Kahneman, 1974) that causes investors to underreact to positive (negative) information about stocks whose prices are near (far from) their 52-week high prices.

[8] See George and Hwang (2004) and Bhootra and Hur (2015) for more detailed explanation.

II. C. Capital Gains Overhang

We compute the capital gains overhang variable using CRSP daily returns following the methodology in Grinblatt and Han (2005) and Hur, Pritamani, and Sharma (2010). The capital gains overhang of a stock represents the percentage deviation of its price from its current reference price, which is the market's aggregate cost basis for the stock. Specifically, for each stock *i* at the end of each month *t*, the capital gains overhang ($CGO_{i,t}$) is obtained as:

$$\text{CGO}_{i,t} = (P_{i,t} - RP_{i,t}) / P_{i,t} \ , \tag{2}$$

where $P_{i,t}$ is the price of the stock *i* at the end of month *t* and $RP_{i,t}$ is the reference price for each stock *i* at the end of month *t*. The reference price, $RP_{i,t}$, is estimated following Grinblatt and Han (2005) as:

$$RP_{i,t} = \frac{1}{k} \sum_{n=1}^{T} \left(V_{i,d-n} \prod_{\tau=1}^{n-1} \left[1 - V_{i,d-n+d} \right] \right) P_{i,d-n} \ , \tag{3}$$

where $V_{i,t}$ is turnover in the stock *i* on day *d*, *T* is the number of trading days in the previous three years with available daily price and volume information, and $P_{i,d-n}$ is price of security *i* on day d-*n*.

Kahneman and Tversky's (1979) prospect theory model of decision making under uncertainty postulates an S-shaped utility function that is concave in the domain of gains but convex in the domain of losses. Thus, investors with the S-shaped utility function are risk averse over positive prospects, but risk loving over negative prospects. The disposition effect documented by Shefrin and Statman (1985) occurs because prospect theory/mental accounting

(PT/MA) investors, sell their winning stocks too quickly and hold on to their losing stocks too long, resulting overpricing (underpricing) of stocks with unrealized capital losses (gains).[9]

III. C. Other Variables

We follow Bali, Cakici, and Whitelaw (2011) to compute the maximum daily stock return (MAX henceforth) for each firm in each month t:

$$MAX_{i,t} = \max(R_{i,d}) \qquad d = 1, \ldots., D_t \tag{4}$$

where $R_{i,d}$ is the return on stock i on day d and D_t is the number of trading days in month t. Next, we follow Bali and Cakici (2008) to compute monthly idiosyncratic volatility (IVOL henceforth) using daily return data. For each stock, we run contemporaneous daily three-factor Fama-French (1993, 1996) regression in each month t:

$$R_{i,d} - R_{f,d} = \alpha_i + \beta_i(R_{m,d} - R_{f,d}) + s_i SMB_d + h_i HML_d + \varepsilon_{i,d} \tag{5}$$

where $R_{i,d}$ is the return of stock i on day d, $R_{f,d}$ is the risk-free rate on day d, $(R_{m,d} - R_{f,d})$, SMB_d and HML_d are the return of the Fama-French market factor, size factor, and book-to-market factor on day d, respectively and $\varepsilon_{i,d}$ is residual of stock i on day d. We compute monthly IVOL of stock i in month t by multiplying the standard deviation of the residuals from equation (2) by the square root of the number of trading days in each month t[10].

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[9] Grinblatt and Han (2005) documents that capital gain overhang explains momentum better than past returns.

[10] We also estimate IVOL using the past 3, 6, and 12 months of daily data. We also estimate IVOL using monthly returns in the past 24 or 36 months (minimum 24 months and maximum 36 months) returns. All main results are quantitatively similar. We thank the referee for this suggestion. Results are available upon request.

We estimate monthly beta using daily return data in each month t, following Scholes and Williams (1977) and Dimson (1979) with the lagged, current, and lead market portfolio in computing beta in order to mitigate the impact of non-synchronous trading:

$$R_{i,d} - R_{f,d} = \alpha_i + \beta_{1,i}(R_{m,d-1} - R_{f,d-1}) + \beta_{2,i}(R_{m,d} - R_{f,d}) + \beta_{3,i}(R_{m,d+1} - R_{f,d+1}) + \varepsilon_{i,d} \quad (6)$$

where $R_{i,d}$ is the return on stock i on day d, $R_{f,d}$ is the risk-free rate on day d, and $R_{m,d}$ is the market return on day d. The estimated market beta of stock i in month t is given by $\hat{\beta}_i = \hat{\beta}_{1,i} + \hat{\beta}_{2,i} + \hat{\beta}_{3,i}$.

We compute firm's book-to-market ratio (B/M) in month t using the book value of equity for the fiscal year ending and market value of equity at the end of December of the prior calendar year. The book value of equity equals stockholders' equity, plus balance sheet deferred taxes and investment credit, minus the book value of preferred stock at the fiscal year ending. Following Amihud (2002), stock illiquidity (ILLIQ henceforth) is computed as the ratio of stock's absolute monthly return to its dollar trading volume. Reversal variable (REV henceforth) is defined as the current month stock return. Following Jegadeesh and Timan (1993), The momentum variable (MOM henceforth) for each stock in month t is computed as the holding period return over the past 12 months from month $t - 12$ to $t - 1$.

Finally, we estimate co-skewness (COSKEW henceforth) as well as idiosyncratic skewness (ISKEW henceforth) following Harvey and Siddique (2000) by the following regression using daily returns for each stock each month t:

$$R_{i,d} - R_{f,d} = \alpha_i + \beta_i(R_{m,d} - R_{f,d}) + \gamma_i(R_{m,d} - R_{f,d}) + \varepsilon_{i,d} \quad (7)$$

where $R_{i,d}$, $R_{f,d}$, and $R_{m,d}$ are return on stock i on day d, risk-free rate on day d and CRSP value-weighted market index on day d, respectively. The ISKEW and COSKEW are the third moment of the residuals and the estimated slope coefficient $\hat{\gamma}_i$, respectively from the equation(7).

III. Empirical Results

III. A. The MAX Effect, GH, and CGO

Table 1 presents value and equal-weighted average monthly returns in month t + 1 for decile portfolios of NYSE, AMEX, and NADSAQ stocks formed by averaging the N highest daily returns (MAX(N)) in month *t*. The sample period is from January 1965 to December 2013. Low MAX(N) is the portfolio of stocks with the lowest average daily returns during month *t* and High MAX(N) is the portfolio of stocks with the highest average daily returns in month *t*. The difference in value-weighted (equal-weighted) average returns for portfolios between high MAX and low MAX is -0.68% (-0.52%) per month with a Newey West (1987) *t*-stat of -2.07 (-1.76) when conditioning on a single day maximum daily return to form portfolios (N=1). When ranking stock on the average of the five highest daily returns (N=5) the difference in value (equal) -weighted average returns for portfolios between high MAX and low MAX is -1.03% (-0.69%) per month with a *t*-stat of -2.87 (-2.22). When ranking portfolios based on N= 2, 3, and 4 we also observe negative and significant differences between high MAX and low MAX portfolios for both value and equal-weighted returns. We also report the difference in alphas for high Max and low MAX portfolios from Fama-French-Carhart four-factor regressions (Fama and French (1993) and Carhart (1997)). The difference in alphas for regressions using value (equal) -weighted returns is a statistically significant -0.99% (-0.74%) when N=1. The difference in alphas is also significant when MAX(N) portfolios are generated using N=2,3,4,5 specifications for both equal and value-weighted returns. The results in table 1 are consistent in both sign and magnitude to the findings of Bali, Cakici, and Whitelaw (2011) who document a negative and significant relation between maximum daily return over the past month and expected returns (the "MAX effect").[11]

(Table 1 Here)

Next we explore the relation between the MAX effect and mispricing of stocks due to 52-week high anchoring bias. Bali, Cakici, and Whitelaw (2011) interpret that the "MAX effect" is driven by investors' preference of stocks with high MAX as lotteries. Investors are willing to pay more for stocks with extreme positive returns, causing those stocks overpriced. Bali, Brown, Murray, and Tang (2014) confirm the "MAX effect" as preference of lotteries. George and Hwang (2004) demonstrate that stocks with high GH ratios (current price/52-week high price) are underpriced and stocks with low GH are overpriced because of the 52- week high anchoring bias. To test how the MAX effect is related to stock price mispricing due to 52-week high anchoring bias, we form two portfolios on GH each month. We label the stocks with a current price far from (close to) their 52-week high price GH1 (GH2). Within GH1 and GH2 we form decile portfolios based on MAX (N=1, and 5) and report value and equal-weighted average monthly returns for month t+1 in table 2. It is important to note that the average number of firms for each cell across decile portfolios for both GH1 and GH2 are 216. For stocks far from their 52-week high price (GH1) we observe a negative and significant difference in value and equal-weighted returns between stocks in high MAX and low MAX portfolios for both MAX (N=1, and 5). For stocks in

[11] There is slight difference in magnitude of returns between this paper and Bali, Cakici and Whitelaw (2011) because first, the sample period in this paper is different, and second, we only include stocks that have at least 12 daily observations in any given month following Brandt et al. (2010) to reduce the noise related to the computation of idiosyncratic volatility.

GH1 the difference in value (equal) -weighted returns between high MAX and low MAX portfolios is -1.72% (-0.95%) a month for MAX(1) and -2.22% (-1.08%) for MAX(5). The differences in alphas between high MAX and low MAX portfolios are also negative and significant for stocks in GH1. For example, the difference in alphas for MAX(5) is -2.71 (-1.51%) a month for value (equal) weighted returns with a *t*-stat of -7.45 (-4.92). However, for stocks that are close to their 52-week high price (GH2) we do not observe a negative and significant difference in value or equal-weighted returns between stocks in high MAX and low MAX deciles. For stocks in GH2 the difference in value-weighed (equal-weighted) returns between high MAX and low MAX portfolios is an insignificant 0.21% (-0.02%) for MAX(1) and 0.02% (-0.09%) for MAX(5). The corresponding *t*-stat is 0.87 (-0.11) for MAX(1) and 0.06 (-0.40) for MAX (5). Results reported in table 2 suggests that the Bali, Cakici, and Whitelaw (2011) "MAX effect" exists only for overpriced stocks that are far from their 52-high that are comprised of half of the entire sample. Stocks that are close to their 52-week high tend to be underpriced and do not exhibit the "MAX effect".

(Table 2 Here)

Stocks may also be mispriced due to the disposition effect. The disposition effect as documented by Shefrin and Statman (1985), occurs due to prospect theory/mental accounting (PT/MA) investors selling their winning stocks too quickly and holding on to their losing stocks too long, this results in overpricing (underpricing) of stocks with negative (positive) capital gains overhang (Grinblatt and Han(2005) and Frazzini (2006)). In table 3 we report equal and value-weighted monthly returns in month $t + 1$ for stocks segregated on capital gains overhang (CGO). We label stocks with negative capital gains overhang CGO < 0 and stocks with positive capital gains overhang CGO>0. For stocks in both CGO < 0 and CGO>0 we form decile portfolios based on MAX(N=1, and 5). Some readers may wonder that decile portfolios in either CGO < 0 or CGO>0 may not have enough number of stocks. However, we find that each decile portfolio on MAX(N=1, and 5) has 213 stocks for CGO < 0 and 220 stocks CGO>0 a month on average in our sample period. For stocks with negative CGO (CGO<0) we observe a negative and significant difference in value and equal-weighted returns between stocks in high MAX and low MAX portfolios. For stocks in the CGO<0 the difference in value (equal) -weighed returns between high MAX and low MAX portfolios is -1.96% (-0.69%) for MAX(1) and -2.48% (-0.80%) a month for MAX(5). The corresponding *t*-stat is -5.45 (-2.15) for MAX(1) and -6.39 (-2.40) for MAX (5). Also, Table 3 reports negative and significant alpha difference between high and low MAX (N=1, and5) portfolios for CGO<0. However, for stocks with positive CGO (CGO>0) we do not observe a significant difference in *t*+1 returns between high MAX and low MAX portfolios. Consistent with the results reported in table 2, the MAX effect exists only for overpriced stocks with negative capital gains overhang. Stocks with positive capital gains overhang tend to be underpriced and do not exhibit the "MAX effect".

(Table 3 Here)

III. B. Mispricing Index

Stambaugh, Yu, and Yuan (2015) construct a proxy for mispricing by averaging each stock's rankings associated with 11 return anomalies that survive adjustment for the Fama-French three factor model and sort stocks based on this composite ranking. Following a method similar to Stambaugh, Yu, and Yuan (2015) we construct a mispricing index to test the relation between the MAX effect and mispricing. To construct the index each month we form five portfolios containing stocks with negative CGO and another five portfolios using stocks with positive CGO.

We assign numbers from 1 to 10 for each stock within CGO portfolios. Stocks in the lowest CGO portfolio are assigned 1's and stocks in the highest CGO portfolio are assigned 10's. Next, we from 10 portfolios based on GH. Stocks in the lowest GH portfolio are assigned 1's and for stocks in higher GH portfolios we assign numbers 2 through 10 according to portfolio rank. We construct a composite rank by summing each stock's CGO and GH portfolio rank. Finally we form two portfolios based on the composite rank. INDEX1 is the portfolio of stocks with low composite ranks and INDEX2 is comprised of stocks with high composite ranks. Based on their GH and CGO composite ranking, stocks in INDEX1 will tend to be overpriced and stocks in INDEX2 tend to be underpriced due to 52-week high anchoring bias and disposition effect.

In Table 4 we report value and equal weighted average monthly returns in month *t*+1 for stocks in INDEX1 and INDEX2. For stocks in both INDEX1 and INDEX2 we form decile portfolios based on MAX(N=1, and 5). There are on average 216 stocks for each decile portfolio for both INDEX1 and INDEX2. For stocks in INDEX1 the difference in value-weighed (equal weighted) returns between high MAX and low MAX portfolios is -1.88% (-0.91%) a month for MAX(1) with a *t*-stat of -5.43 (-3.02) and -2.29% (-1.04%) a month for MAX(5) with a *t*-stat of -6.05 (-3.29). The difference in returns between high and low MAX (N=1, and 5) deciles stocks in INDEX1 is both statically and economically significant. The negative relation between high MAX and low MAX deciles for overpriced INDEX1 stocks is consistent with the MAX effect. However, underpriced stocks in INDEX2 do not exhibit the MAX effect. The difference between the value (equal) -weighed returns between high MAX and low MAX portfolios is an insignificant 0.15% (-0.02%) for MAX(1) with a *t*-stat of -0.59 (-0.09) and -0.06% (-0.13%) for MAX(5) with a *t*-stat of -0.19 (-0.53) for stocks in INDEX2. The disappearance of the MAX effect for INDEX2 stocks is especially notable because nearly half of all stocks fall into INDEX2.

(Table 4 here)

In table 5 we report summary statistics for high and low MAX portfolios for both INDEX1 and INDEX2 stocks. The table reports time-series average of monthly median values of various characteristics of stocks in each decile. Average values are reported for the maximum daily return in percent (MAX), idiosyncratic volatility in percent (IVOL), the monthly return in the month of portfolio formation (REV), price (PRICE), market capitalization in millions of dollars (SIZE), market beta (BETA), the book-to-market ratio (B/M), illiquidity scaled by 100,000 (ILLIQ), and the return from *t*-11 to *t*-1 (MOM).

There are several notable patterns among stock characteristics in the portfolios. For INDEX1(INDEX2) from the low MAX to the high MAX decile the average of the median daily maximum return increases from 1.15% (0.85%) to 12.20% (7.67%). IVOL tends to increase with MAX. INDEX1 (INDEX2) has an average median IVOL of 6.30% (3.60%) for the low MAX portfolio and 41.91% (23.94%) for the high MAX portfolio. REV also increases with MAX. INDEX1 (INDEX2) low MAX portfolio stocks the average median REV is -6.29% (-.097%). Average median REV increases to 5.20% (21.28%) for high MAX INDEX1 (INDEX2) stocks. The patterns of MAX, IVOL, REV across decile portfolios reveals that three variables are highly positively related.

(Table 5 Here)

III. C. Bivariate Portfolios and Firm level Cross-sectional Regressions

Next we examine the relation between MAX and overpricing after controlling for size, book-to-market, momentum, short term reversal, and illiquidity. Using the method described in section III.B we sort stocks into overpriced (INDEX1) and underpriced (INDEX2) indexes. To control for size within INDEX1 and INDEX2 each month during the sample period, we sort stocks into 10 portfolios on market capitalization. Within each decile portfolio on market capitalization, we sort stocks based on MAX(5)[12]. We then average the monthly value and equal-weighted month *t* + 1 returns across each size decile for each index to produce a total of 20 portfolios with dispersion in MAX but will similar market capitalizations. Table 6 reports monthly value and equal-weighted average returns in month *t*+1.

(Table 6 Here)

After controlling for size the difference between high MAX and low MAX portfolio value (equal) weighted monthly retunes is -2.63% (-1.89%) with a Newey-West *t*-stat of -9.79 (-7.71) for stocks in INDEX1. Thus the MAX effect remains after controlling for size for stock in INDEX1. For INDEX2 stocks, the difference between high MAX and low MAX portfolio value and equal weighted average monthly returns is not statistically significant after controlling for size. Consistent with the results reported in table 4, while overpriced stocks in INDEX1 show the significant MAX effect even after controlling for size, underpriced stocks in INDEX2 do not present any evidence of the MAX effect after controlling for size.

We control for book-to-market (B/M) using a method similar to the one used to control for size and report the results in the second column of table 6. Again for stocks in INDEX1 we observe evidence of the MAX effect with an average monthly difference in value (equal) weighed returns between high MAX and low MAX deciles of -2.75% (-1.35%) with a Newey-West *t*-stat of -8.52 (-4.14). After controlling for B/M the difference between the average monthly returns of high

[12] We use MAX(5) because Bali, Brown, Murray, and Tang (2014) show that MAX(5) has greater properties of lottery demand relative to MAX(1). However, using MAX(1) produces similar results

MAX and low MAX deciles is not statistically significant for stocks within INDEX2. Thus, even after controlling for B/M, we only observe evidence of the MAX effect for overpriced stocks.

Momentum (MOM) also cannot explain the MAX effect for overpriced stocks. After controlling for MOM using a bivariate sort we observe economically large differences in high MAX and low MAX decile monthly value (equal) weighted returns of -2.57% (-1.27%) for INDEX1 but not for INDEX2.

It is possible that the MAX effect could be explained by the well-known short term reversal phenomenon (REV). However, even after controlling for REV we still observe a value (equal) weighted return difference of -1.98% (-0.42%) for INDEX1 stocks. Again, differences between high MAX and low MAX deciles monthly returns are insignificant for INDEX2 stocks.

We control for liquidity by forming double-sorted portfolios based on Amihud (2002) illiquidity measure (ILLIQ) and MAX(5). Consistent with previous reported results, after controlling for ILLIQ we observe a statistically and economically significant difference in monthly $t + 1$ returns between high and low MAX deciles for INDEX1 but not INDEX2 stocks.

The results in table 6 show that the MAX effect persists for overpriced (INDEX1) stocks but not underpriced (INDEX2) stocks, even after controlling for well-known effects including size, book-to-market, momentum, short-term reversal, and liquidity.

(Table 7 Here)

To control for multiple effects or factors simultaneously we run firm level cross sectional regressions. Using Fama and Macbeth (1973) regressions we examine the relation between MAX and t+1 stock returns after controlling for various factors including our overprinting index.

In table 7 we report time-series average of the estimated coefficients for the following model:

$$R_{i,t+1} = \beta_{0,t} + \beta_{1,t}MAX_{i,t} + \beta_{2,t}MAX * IND_{i,t} + \beta_{3,t}IND_{i,t} + \beta_{4,t}IVOL_{i,t} + \beta_{5,t}REV_{i,t} + \beta_{6,t}SIZE_{\ i,t} + \beta_{7,t}BETA_{\ i,t} + \beta_{8,t}B/M_{\ i,t} + \beta_{9,t}ILLIQ_{i,t} + \beta_{10,t}MOM_{i,t} + \beta_{11,t}COSKEW_{i,t} + \beta_{12,t}ISKEW_{i,t} + \varepsilon_{i,t+1}, \quad (7)$$

where $R_{i,t+1}$ is the return of stock *i* in month *t+1*. MAX is the maximum daily return(MAX(1)) or the average of the five highest maximum daily returns (MAX(5)) for stock *i* during month *t*, , IND is an indicator variable equal to 0 for stocks that are in INDEX1 during month *t* and 1 if stocks are in INDEX2 during month *t*, IVOL is idiosyncratic volatility, REV is return in month *t* to proxy for short term reversal, SIZE is market capitalization, BETA is the market beta, B/M is the book-to-market ratio, ILLIQ is a measure of illiquidity, MOM is the return from t-12 to t-1, COSKEW is a measure of coskewness, ISKEW is idiosyncratic skewness.

In table 7 we report regression results for eight different specifications. In regression (1)-(4) we use the maximum daily return MAX(1) and in regressions (5)-(8) we use the MAX(5). In regression specifications (1) and (5) we observe a negative and significant relation between MAX and stock returns in month *t* + 1. The average slope of $\beta_{1,t}$ from the monthly regressions of future returns on MAX alone is -0.041 and -0.107 with a Newey-West *t*-stat of -3.83 and -4.05 for regression (1) and (5), respectively. The average slope of $\beta_{1,t}$ in regressions (1) and (5) is consistent in both sign and magnitude to the findings of Bali, Cakici, and Whitelaw (2011).

In regression specifications (2) and (3) we add both IVOL and REV to the model. Ang, Hodrick, Xing, and Zhang (2006, 2009) show that idiosyncratic volatility, puzzlingly, has a negative relation with future returns. However, Bali, Cakici, and Whitelaw(2011) show that after controlling for MAX the negative relation between IVOL and future returns reverses. Jegadeesh (1990), Fu (2009) and Huang, Liu, Rhee and Zhang (2010) document that loser stocks in month *t* generally outperform winners in the subsequent month *t* + 1. Similarly, Lo and MacKinlay (1990) and Lehmann (1990) also report strong evidence of stock return reversals at the weekly interval. Moreover, summary statistics in Table 5 suggests that the MAX effect may be driven by IVOL or/and REV because MAX, IVOL, and REV have similar pattern across decile portfolios on MAX. The average slope coefficients on REV are -0.057 and -0.040 with a *t*-stat of -11.33 and -6.93 in regressions (2) and (6), respectively. The average slope of IVOL is 0.007 with a *t*-stat of 0.41 and 0.058 with a *t*-stat of 4.46 for regressions (2) and (6) respectively. A positive correlation of IVOL and realized returns (albeit insignificant in regression (2)) after controlling for MAX is consistent with the finding of Bali, Cakici, and Whitelaw (2011).

In models (3) and (7) we control for mispricing by adding an interaction between MAX and IND, $MAX * IND_{i,t}$ and $IND_{i,t}$ to the model while continuing to control for *IVOL* and *REV*. After controlling for mispricing the average slope coefficient of MAX remains negative and significant. The average slope coefficient of MAX(1) (MAX(5)) in regression (3) ((7)) is -0.049 (-0.123) with a Newey-West *t*-stat of -4.33(-2.67). The average slope coefficient of $MAX * IND_{i,t}$ in regression (3) is 0.087 with a *t*-stat of 8.18 and 0.074 with a *t*-stat of 7.53 in regression (7). The average slope of $IND_{i,t}$ is insignificant 0.257 with a *t*-stat of 1.54 for regression (3) and is significant 0.317 with a *t*-stat of 1.99 for regression (7). Consistent with the results of our double-sorted portfolios in Table 4 and 6, the positive sign on $MAX * INDEX_{i,t}$ implies that the well documented MAX effect is stronger for stocks in INDEX1 than stocks in INDEX2. Consistent with regression specification (2) and (6) the average slope of IVOL(REV) is positive (negative) in regression (3) and (7).

To further control for multiple effects simultaneously in firm level regressions (4) and (8) we add SIZE, BETA, B/M, ILLIQ, MOM, COSKEW, and ISKEW. The average slope coefficients on SIZE, BETA, B/M, ILLIQ, MOM, COSKEW, and ISKEW all have signs and magnitudes consistent with prior studies. The average slope of SIZE is negative and significant suggesting there is a size premium. Consistent with prior studies (Fama and French (1992, 1993, 1996), the average slope of SIZE is negative and significan, but the average slope of the market beta is insignificant. The positive average coefficients on ILLIQ suggests that stocks that are more illiquid have higher expected returns (Amihud (2002), Nagel (2012), and Hameed and Mian (2014)). MOM (Jegadeesh and Titman (1993, 2001)), COSKEW and ISKEW (Bali, Cakici, and Whitelaw (2011) all have positive average slope coefficients. The average slope of $\beta_{1,t}$ in model full specifications (4) and (8) is -0.056 and -0.159 with a *t*-stat of -4.22 and -3.22, respectively that are similar to previous model specifications. The average slope coefficient of $MAX * INDEX_{i,t}$ is positive and significant0.077 and 0.196 for model (4) and (8), respectively, confirming again that that the MAX effect is stronger for stocks in INDEX1 than INDEX1 even after controlling for multiple factors. Moreover, the full specification (4) and (8) suggest that the MAX effect turns positive (albeit it looks insignificant) for overpriced stocks in INDEX2 when multiple effects are controlled.

Overall the firm-level regressions confirm the results of the portfolio analysis, stock with high maximum daily returns have low expected returns in the following month and this “MAX effect” exists primarily for overpriced stocks.

III. D. Price Restrictions, the Max Effect, Idiosyncratic Volatility, and Reversal

It is common practice in the literature to exclude stocks whose price is less than \$5. This approach is often used to eliminate the effects of small, illiquid stocks, and microstructure effects.[13] Bali and Cakici (2008) documents that IVOL effect depends on the choice of breakpoint of idiosyncratic volatility and weighing scheme of returns. In this section we explore if the well documented IVOL puzzle (Ang, Hodrick, Xing and Zhang (2006, 2009), Bhootra and Hur (2015), and Stambaugh, Yu, and Yuan (2015)) is robust to different sample specifications. We also test if the finding that the "MAX effect" only exists for overpriced stocks is robust to a stock price restriction.

First we report simple cross-sectional correlations between MAX(1), MAX(5), and IVOL for our sample of NYSE, AMEX and NASDAQ stocks from January 1965 to December 2013. Table 8 reports average cross-sectional correlations for the sample both without the \$5 price restriction (No Price Restriction) and with the \$5 price restriction (Price ≥ \$5). As expected the correlation between MAX(1) and MAX(5) is very high. As reported in table 8 panel A, the average correction between MAX(1) and MAX(5) is 0.89 for both the sample without the price restriction and the sample with a \$5 price restriction. The maximum (minimum) cross-sectional correlation between MAX(1) and MAX(5) over the sample period is 0.95 (0.84) for the sample with no price restriction and 0.94 (0.83) for the sample with the \$5 price restriction.

(Table 8 Here)

MAX(1) and MAX(5) are also highly correlated with IVOL in both samples. MAX(1) (MAX(5)) and IVOL have an average cross-sectional correlation of 0.90 (0.93) for the sample without the \$5 price restriction. For the sample with the \$5 price restriction the correlation between

[13] Jiang, Xu, and Yao (2009) document that \$5 price restriction helps avoiding market microstructure related issues.

the MAX(1) (MAX(5)) and IVOL is 0.88 (0.92). Remarkably, in sample with no price restrictions, the average cross-sectional correlation between MAX(1)(MAX(5)) and IVOL exceeds the cross-sectional correlation between MAX(1) and MAX(5) in magnitude. The maximum and minimum correlations between MAX and IVOL are also very high. The maximum (minimum) cross-sectional correlation between MAX(1) and IVOL is 0.98 (0.80) for the sample with no price restriction and 0.98 (0.78) for the sample with the $5 price restriction. Also, the average cross-sectional correlation between MAX(1) (MAX(5)) and REV 0.35 (0.45) for the sample with no price restriction and 0.44 (0.51) for the sample with the $5 price restriction. REV and IVOL has average correlation of 0.16 and 0.13 for the sample with no price restriction and with the $5 price restriction, respectively.

The results reported in table 8 confirms Table 5 and also suggest that the strong positive relation among MAX, IVOL, and REV opens the possibility that the MAX effect may be another manifestation of the IVOL or reversal puzzle.

Next we export the impact imposing a $5 stock price restriction has on the "MAX effect", the IVOL puzzle, and short-term reversal. In table 9 we report value and equal-weighted average monthly returns in month *t*+1 for decile portfolios formed by sorting MAX(1), MAX(5) , IVOL and REV in month *t*. Columns two through five report portfolio *t*+1 returns for the sample without a price restriction while columns six through eight report portfolio *t*+1 returns for the sample with a $5 price restriction. As previously reported in this paper, in the sample without a price restriction we observe a significant negative difference in equal and value-weighted returns between high MAX and low MAX decile portfolios. We also observe a significant difference in the four-factor alphas of high max and low max portfolios for both equal and value-weighted returns in the no price restriction sample.

We also observe evidence of the MAX effect when using a sample with a $5 price restriction. For value-weighted portfolios the difference in monthly returns between high MAX and low MAX portfolios is -0.56% (-0.70%) with a Newy-West t-stat of -1.87 (-2.14) for portfolios formed using MAX(1) (MAX(5)). The difference in monthly returns between high MAX and low MAX portfolios with equal weighted returns is a significant -0.87% when using MAX(1) to form portfolios and -1.04% when using MAX(5) to form portfolios. For value-weighted portfolios, the difference in average four-factor alphas between high MAX and low MAX deciles is a significant -0.81% (-0.97%) when using MAX(1) (MAX(5)) to form portfolios. For equal-weighted portfolios, the difference in average four-factors alphas between high MAX and low MAX deciles is -1.19%% (-1.14%) when using MAX(1) (MAX(5)) to form portfolios.

(Table 9 here)

When a $5 price restriction is imposed the difference in average value-weighted returns between high MAX and low MAX is smaller, in absolute value, relative to using a sample without a price restriction. For equal-weighted the opposite effect is observed, the difference in average equal-weighted returns between high MAX and low MAX deciles is larger, in absolute value, for the Price ≥ $5 sample. Sample differences in average four-factor alphas between high and low MAX deciles follow a similar pattern to returns for value and equal-weighted portfolios. Thus after imposing the $5 price restriction the MAX effect becomes slightly weaker (stronger) for value (equal)-weighted portfolios.

Ang, Hodrick, Xing, and Zhang (2006, 2009) show that idiosyncratic volatility has a significant negative relation with expected returns (the IVOL puzzle). To see what impact imposing a price restriction has on the IVOL puzzle we form decile portfolios using IVOL and report equal and value-weighted average $t + 1$ returns in table 9. For the sample without a price restriction the difference in high and low IVOL decile average value-weighted monthly returns is -1.14% with a *t*-stat of -2.78. The negative relation between high IVOL and expected returns is consistent with the IVOL puzzle. However, consistent with Table 1 of Bali and Cakici (2008), we do not observe a significant difference in high and low IVOL decile equal-weighted returns when using the sample without price restrictions. When using the sample with a $5 price restriction the difference in high and low IVOL decile average value (equal) -weighted monthly returns is a statistically significant -0.76% (-0.91%).

Short-term reversal effect (Jegadeesh (1990) and Huang, Liu, Rhee and Zhang (2010)) becomes weaker for both value and equal weighted returns as we impose a $5 price restriction. The difference between high REV and low REV changes from -0.55% (-2.81%) to -0.26% (-1.03%) for value (equal) weighted returns.

Overall the results in table 9 show that the choice of stock price breakpoint and weighing scheme when forming a sample can have critical implications on observed results.

Next we explore the impact imposing a stock price restriction has on our previously reported result that the MAX effect is isolated to overpriced stocks. As outline in III.B we first separate sample stocks into INDEX1 and INDEX2 based on their composite rank. INDEX1 stocks tend to be overpriced and INDEX2 stocks tend to be underpriced. For stocks in INDEX1 and INDEX2 we form decile portfolios based on the average of the five highest daily returns (MAX(5)),IVOL, and REV.[14] We report value and equal-weight average *t*+1 returns in table 10 for the sample with and without a $5 price restriction.

[14] In table 10 we report results based on portfolios formed using MAX(5). The results are quantitatively similar when we use MAX(1) to form portfolios.

(Table 10 here)

As previously reported in Table 4, the negative relation between MAX and expected returns is restricted to INDEX1 stocks for the sample with no price restriction. When using a sample with a $5 price restriction we also only observe evidence of the MAX effect in overpriced stocks. For the sample with a $5 price restriction, the difference in average value (equal)-weighted monthly returns between high and low MAX portfolios is -1.95% (-2.27%) with a *t*-stat of -6.18 (-9.69) for INDEX1 stocks. The difference in average *t*+1 monthly returns is not significant for INDEX2 stocks in the sample with a $5 price restriction.

The absolute difference in average monthly returns between high MAX and low MAX deciles is smaller when using a $5 price restriction versus no price restriction when using value-weighted returns. The absolute difference in average monthly returns between high MAX and low MAX deciles is larger when using a $5 price restriction when using equal-weighted returns. Consistent with the results in table 9, for the sample with a $5 price restriction, the MAX effect is slightly weaker (stronger) for value (equal)-weighted portfolios relative to the MAX effect in the sample without a price restriction.

To determine if the IVOL puzzle is confined only to overpriced stocks we employ a similar method. After separating stocks into INDEX1 and INDEX2 we form decile portfolios based on IVOL and report value and equal-weight *t*+1 average monthly returns in table 10. For value weighted returns portfolios the difference in average monthly returns between high IVOL and low IVOL deciles is a significant -2.17% for INDEX1 stocks when using the sample without a $5 price restriction. For INDEX2 stocks the difference in high and low IVOL decile returns is not significant. When we implement a $5 price restriction the difference in average monthly returns between high IVOL and low IVOL deciles is a significant -1.86% for INDEX1 stocks and not significant for INDEX2 stocks. The difference in average alphas between high and low IVOL portfolios is negative and significant for only INDEX1 stocks in both samples. Thus, the IVOL puzzle also appears to be isolated to overpriced stocks.

Consistent with the results of table 9 when using equal-weighted returns we do not observe evidence of the IVOL puzzle in the sample without price restrictions. In the sample with a $5 price restriction we observe a significant difference in equal-weighted average monthly returns between high and low IVOL deciles for only INDEX1 stocks.

Overall the results reported in table 10 show that both the MAX effect and IVOL puzzle are restricted to overpriced stocks and this finding is robust to both a sample with and without a $5 price restriction.

Next we rerun the firm level cross sectional regressions reported in table 7 with a $5 price restriction. We report the regression results in table 11. Consistent with the results reported in table 7, there is a negative and signification relation between MAX and stock returns in month t+1 for INDEX1 stocks. The average slope coefficient of MAX(1) (MAX(5)) in regression (4) ((8)) is -0.051(-0.201) with a Newey-West t-stat of -3.55 (-3.63). The average slope coefficient of $MAX * IND_{i,t}$ in regression (4) is 0.149 with a *t*-stat of 15.02 and 0.37 with a *t*-stat of 15.00 in regression (8). The positive sign on $MAX * INDEX_{i,t}$ implies that the MAX effect is stronger for stocks in INDEX1 than stocks in INDEX2.

However, unlike the results reported in table 7, we observe a negative and significant relation between IVOL and t+1 returns. The average slope coefficient on IVOL is -.064 with a t-stat of -4.59 and -0.040 with a t-stat of -3.12 in model specification (4) and (8) respectively. The results reported in table 11 suggest that when using a sample with a price restriction and after controlling for mispricing both the idiosyncratic volatility puzzle and the MAX effect remain.

(Table 11 Here)

III.E. Persistence of the Max Effect

In this section we export the persistence of the MAX effect. Table 12 reports the difference of average monthly value and equal-weighted returns between the highest decile MAX and the lowest decile MAX in months *t*+2 through *t*+6.[15] In table 12 panel A.1(2) we report value (equal) –weighted average monthly returns. The value and equal weighted returns in panel A for months *t*+2 through *t*+6 are either not statistically significant or only marginally significant suggesting that the MAX effect does not persist for more than one month.

(Table 12 Here)

Using the procedure outlined in section in III.B we divide the sample stocks into INDEX1 and INDEX2. We report *t*+2 through *t*+6 average monthly return difference between the highest MAX decile and the lowest MAX decile portfolio in panel B of table 12. For INDEX1 stocks the MAX effect is persists for up to four month. The value (equal) -weighted *t*+2 through *t*+4 average monthly returns are significant -1.01%(-1.06%), -0.75%(-0.77%) and -1.03%(-0.66%) respectively. There is no evidence of the MAX effect in months *t*+2 through *t*+6 for INDEX2 stocks. Thus the MAX effect seems to persist for overpriced stocks.

[15] In table 12 we report results based on portfolios formed using MAX(5) and use a sample with a $5 price restriction. The results are quantitatively similar when we use MAX(1) to form portfolios.

III.F. Price Restrictions, the Max Effect, Idiosyncratic Volatility across Market States

Next we examine whether the cross-sectional predictive power of the idiosyncratic volatility and MAX is stronger (or weaker) during different market states[16]. We explore three different (but not mutually exclusive) market states: recessions vs. expansions, high vs. low economic activity states, and during up vs. down markets. We use the Federal Reserve Bank of St. Louis, NBER based recession indicators for the United States to classify recession and non-recession months[17]. To classify high vs. low economic activity states we use the Chicago FED National Activity (CFNAI) index. Months with a CFNAI index level greater than 0 is classified as highly economic activate and a CFNAI less than 0 is classified as having low economic activity. We use returns of the S&P 500 index to classify up and down markets. Results for stock with a $5 price restriction are reported in table 13[18].

For INDEX 1 stocks the difference in average value weighted monthly returns between high and low MAX (IVOL) portfolios is a statically significant -3.96% (-3.58%) during recession months and a statistically insignificant -1.62% (-1.58%) during expansion months. For INDEX2 stocks the difference in high and low IVOL and MAX deciles returns are not significant. These results suggests that the MAX and IVOL effects does not appear to be subject to the business cycle for overpriced stocks. And underpriced stocks in INDEX2 do not show the MAX effect and IVOL effects in either recession or expansion months.

For high and low economic activity months for INDEX1 stocks the difference in average value weighted monthly returns between high and low MAX (IVOL) portfolios is a statically

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[16] We thank a referee for this suggestion

[17] See https://fred.stlouisfed.org/series/USREC

18 For brevity, we report only value weighed return. Results using equal-weighted returns are similar and are available upon request.

significant -1.94% (-1.91%) when CFNIA < 0 months and -1.95% (-1.82%) when CFNIA >0 months. For INDEX2 stocks the difference in high and low IVOL and MAX deciles returns are not significant. These results suggest that the MAX and IVOL effects for INDEX1 stock during both low and high economic activity months. Underpriced stocks in INDEX2 do not show MAX effect or IVOL effect for both low and high economic activity months.

(Table 13 Here)

For up and down markets we also find evidence of the MAX and IVOL effects for overpriced stocks. The difference in average value weighted monthly returns between high and low MAX (IVOL) portfolios is a statically significant -2.70% (-2.63%) when S&P 500 monthly returns are less than 0 and -1.41% (-1.31%) when S&P 500 monthly returns are greater than 0. Underpriced stocks do not show the MAX effect or IVOL effects for either up or down markets.

Overall the results from table 13 suggests that the MAX and IVOL effects do not appear to be subject to market states for overpriced stocks. Underpriced stocks do not show the MAX effect and IVOL effects in any market state.

IV. Conclusion

We explore the relation between the stock mispricing that occurs due to capital gains overhang and 52-week high anchoring bias, and the MAX effect. We create a composite mispricing index using capital gains overhang (CGO) and the George and Hwang ratio (GH). We form two portfolios based on high and low index values. The tendency for stocks with high maximum daily return in the previous month to have low returns in the current month (the "MAX effect") is isolated to overpriced stocks. There is no evidence of the "MAX effect" for underpriced stocks which account for about half the entire sample. The findings suggests that the tendency for investors to pay more for stocks with extreme positive returns (Bali et al 2011) is more prevalent for stocks that have negative capital gains overhang and are far from there 52 week high (overpriced stocks).

The average cross-sectional correlation is 90% between the MAX and the IVOL, 35% between the MAX and the REV, and 16% between the IVOL and the REV. Bali, Cakici and Whitelaw (2011) demonstrate without a $5 price restriction the after controlling for MAX the puzzling negative relation between idiosyncratic volatility and future returns (the IVOL puzzle) disappears.[19] However, we observe evidence of the IVOL puzzle using both value and equal-weighted returns with a $5 price sample restriction. With a $5 price restriction and overpriced stocks, we document that both the MAX effect and the IVOL puzzle are significant economically and statistically and this finding is robust to other firm characteristics.

[19] Ang, Hodrick, Xing, and Zhang (2006, 2009) document the IVOL puzzle.

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Table 1
Returns and Alphas of Portfolios Sorted by MAX

This table reports the value weighted (VW) and equal weighted (EW) average monthly returns of portfolios in month *t* + 1. Decile portfolios are formed on the average of the N highest daily returns (MAX(N)) each month *t*. Low (High) MAX(N) is the portfolios of stocks with the lowest (highest) MAX(N) in month *t*. Stocks from NYSE, AMEX, and NASDAQ with share code 10 or 11 are included in the sample from January 1965 to December 2013. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted *t*-statistics are reported in parentheses.

	N=1	N=2	N=3	N=4	N=5
Panel A: Value-Weighted Returns of Portfolios on MAX (N)					
Low MAX(N)	0.83	0.87	0.89	0.90	0.96
2	0.92	0.89	0.90	0.94	0.95
3	0.91	0.93	0.96	0.96	0.95
4	0.98	1.01	0.97	0.97	0.98
5	0.98	1.00	1.01	0.98	0.95
6	1.06	1.01	1.02	0.99	0.97
7	0.92	0.95	0.94	0.99	1.04
8	0.82	0.75	0.64	0.67	0.64
9	0.51	0.48	0.48	0.47	0.48
High MAX(N)	0.15	-0.01	0.00	-0.03	-0.07
High - Low	-0.68	-0.88	-0.90	-0.94	-1.03
	(-2.07)	(-2.59)	(-2.54)	(-2.59)	(-2.87)
Alpha	-0.99	-1.23	-1.20	-1.24	-1.34
	(-3.70)	(-4.08)	(-3.68)	(-3.74)	(-3.92)
Panel B: Equal-Weighted Returns of Portfolios on MAX (N)					
Low MAX(N)	1.20	1.20	1.20	1.20	1.21
2	1.32	1.32	1.33	1.37	1.40
3	1.46	1.43	1.45	1.46	1.47
4	1.43	1.48	1.50	1.51	1.50
5	1.42	1.46	1.48	1.45	1.46
6	1.39	1.39	1.39	1.44	1.43
7	1.30	1.38	1.37	1.37	1.37
8	1.28	1.23	1.23	1.24	1.21
9	1.03	1.00	0.99	0.93	0.94
High MAX(N)	0.68	0.62	0.56	0.54	0.52
High - Low	-0.52	-0.58	-0.64	-0.66	-0.69
	(-1.76)	(-1.88)	(-2.06)	(-2.13)	(-2.22)
Alpha	-0.74	-0.83	-0.92	-0.96	-0.99
	(-2.71)	(-2.89)	(-3.15)	(-3.26)	(-3.46)

Table 2
Returns and Alphas of Portfolios Sorted by GH and MAX

This table reports the value weighted (VW) and equal weighted (EW) average monthly returns of portfolios in month *t* + 1. Each month *t* stocks from NYSE, AMEX, and NASDAQ with share code 10 or 11 are grouped into two portfolios based on GH ratio (George and Hwang Ratio = current price/52-week high price) from January 1965 to December 2013. Then, decile portfolios are formed on the average of the N highest daily returns (MAX(N)) each month *t* within each two separate samples of stocks based on GH. GH1 (2) is the lowest (highest) portfolio on GH. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	Panel A: MAX(1)				Panel B: MAX(5)			
	VW		EW		VW		EW	
	GH1	GH2	GH1	GH2	GH1	GH2	GH1	GH2
Low MAX(N)	1.07	0.88	1.56	0.96	1.11	0.88	1.62	0.95
2	1.09	0.79	1.63	1.21	1.17	0.94	1.71	1.24
3	1.18	0.98	1.53	1.29	1.13	0.86	1.64	1.27
4	0.94	0.96	1.44	1.33	1.02	1.02	1.55	1.32
5	0.82	0.90	1.31	1.33	0.87	0.96	1.39	1.38
6	0.91	1.12	1.22	1.48	0.93	0.98	1.24	1.38
7	0.54	1.09	1.11	1.37	0.32	1.15	1.08	1.41
8	0.12	1.09	0.94	1.40	-0.06	1.17	0.81	1.45
9	-0.17	1.12	0.88	1.36	-0.24	1.08	0.65	1.39
High MAX(N)	-0.65	1.09	0.61	0.93	-1.11	0.90	0.54	0.86
High - Low	-1.72	0.21	-0.95	-0.02	-2.22	0.02	-1.08	-0.09
	(-4.93)	(0.84)	(-3.15)	(-0.11)	(-5.82)	(0.06)	(-3.40)	(-0.40)
Alpha	-2.25	-0.17	-1.27	-0.57	-2.71	-0.50	-1.51	-0.70
	(-7.27)	(-0.82)	(-4.28)	(-3.49)	(-7.45)	(-2.10)	(-4.92)	(-3.94)

Table 3
Returns and Alphas of Portfolios Sorted by CGO and MAX

This table reports the value weighted (VW) and equal weighted (EW) average monthly returns of portfolios in month *t* + 1. Each month *t* stocks from NYSE, AMEX, and NASDAQ with share code 10 or 11are grouped into two portfolios based on CGO (capital gains overhang) from January 1965 to December 2013. CGO < 0 (CGO >0) is a portfolio of stocks with negative (positive) CGO. Then, decile portfolios are formed on the average of the N highest daily returns (MAX(N)) each month *t* within each two separate samples of stocks based on CGO. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	Panel A: MAX(1)				Panel B: MAX(5)			
	VW		EW		VW		EW	
	CGO<0	CGO>0	CGO<0	CGO>0	CGO<0	CGO>0	CGO<0	CGO>0
Low MAX(N)	0.87	0.86	1.29	1.08	0.93	0.83	1.32	1.09
2	0.99	0.82	1.45	1.25	1.00	0.92	1.48	1.26
3	0.80	0.89	1.38	1.34	0.86	0.87	1.46	1.32
4	0.77	0.88	1.34	1.35	0.71	0.91	1.45	1.37
5	0.62	0.96	1.28	1.35	0.63	0.89	1.40	1.36
6	0.53	1.07	1.13	1.47	0.42	1.10	1.19	1.45
7	0.25	1.03	1.22	1.42	0.12	1.07	1.10	1.44
8	0.14	1.02	1.03	1.43	-0.17	1.01	0.92	1.43
9	-0.26	1.02	0.89	1.33	-0.35	0.85	0.80	1.37
High MAX(N)	-1.09	0.98	0.60	1.00	-1.55	0.94	0.51	0.93
High - Low	-1.96	0.13	-0.69	-0.08	-2.48	0.11	-0.80	-0.16
	(-5.45)	(0.48)	(-2.15)	(-0.33)	(-6.39)	(0.34)	(-2.40)	(-0.59)
Alpha	-2.48	-0.14	-0.96	-0.58	-2.99	-0.29	-1.16	-0.76
	(-7.93)	(-0.57)	(-3.11)	(-2.65)	(-8.16)	(-1.02)	(-3.61)	(-3.26)

Table 4
Returns and Alphas of Portfolios Sorted by Composite Rank and MAX

This table reports the value weighted (VW) and equal weighted (EW) average monthly returns of portfolios in month $t + 1$. Each month t we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month t. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. INDEX1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Then, decile portfolios are formed on the average of the N highest daily returns (MAX(N)) each month t within each two separate samples of stocks, INDEX1 and INDEX2. Stocks from NYSE, AMEX, and NASDAQ with share code 10 or 11are included in the sample. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	Panel A: MAX(1)				Panel B: MAX(5)			
	VW		EW		VW		EW	
	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2
Low MAX(N)	1.06	0.88	1.47	1.02	1.02	0.89	1.50	1.01
2	1.23	0.83	1.61	1.25	1.28	0.96	1.69	1.28
3	1.12	1.01	1.49	1.33	1.11	0.92	1.57	1.33
4	0.89	0.87	1.40	1.38	1.07	1.03	1.56	1.37
5	0.73	1.01	1.25	1.38	0.61	0.96	1.33	1.40
6	0.71	1.19	1.18	1.47	0.63	1.14	1.22	1.45
7	0.39	1.16	1.11	1.46	0.29	1.20	1.05	1.43
8	0.03	1.08	0.94	1.43	-0.06	1.14	0.76	1.48
9	-0.35	1.19	0.78	1.39	-0.39	1.13	0.64	1.46
High MAX(N)	-0.82	1.03	0.56	1.00	-1.27	0.84	0.46	0.88
High - Low	-1.88	0.15	-0.91	-0.02	-2.29	-0.06	-1.04	-0.13
	(-5.43)	(0.59)	(-3.02)	(-0.09)	(-6.05)	(-0.19)	(-3.29)	(-0.53)
Alpha	-2.55	-0.16	-1.26	-0.57	-2.74	-0.43	-1.49	-0.75
	(-7.24)	(-0.76)	(-4.30)	(-3.35)	(-7.35)	(-1.64)	(-4.95)	(-3.84)

Table 5
Summary Statistic of Portfolios Sorted by MAX

This table reports time-series averages of cross-sectional median values each month of portfolios. Each month *t* we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month *t*. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. INDEX1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Then, decile portfolios are formed on the average of the 5 highest maximum daily return (MAX(5)) for each stock in month *t* within each two separate samples of stocks, Index1 and Index2. Stocks from NYSE, AMEX, and NASDAQ with at least 12 daily observations in each month are included in the sample each month *t* from January 1965 to December 2012. Size is market capitalization in millions of dollars. Beta is the market beta. B/M is the book-to-market ratio. ILLIQ is illiquidity measure scaled by 100,000. REV is monthly return in the current month *t* when decile portfolios are formed. MOM is return from *t* -12 to *t* -1. IVOL is idiosyncratic volatility. The detailed explanations are provided in the main text.

	MAX	IVOL	REV	Size	Beta	B/M	ILLIQ.	Price	MOM
				Panel A: Index 1					
Low MAX	1.15	6.30	-6.29	228.71	0.35	0.76	0.24	14.67	-16.87
2	1.92	8.54	-5.66	203.83	0.59	0.71	0.07	14.25	-13.26
3	2.51	10.31	-4.99	154.65	0.75	0.70	0.04	13.27	-13.30
4	3.06	12.03	-4.46	122.19	0.87	0.69	0.05	11.67	-13.95
5	3.63	13.83	-3.86	98.85	0.97	0.68	0.05	10.08	-14.76
6	4.27	15.85	-3.14	76.77	1.04	0.70	0.07	8.60	-15.85
7	5.05	18.31	-2.32	60.47	1.10	0.71	0.09	7.24	-17.24
8	6.10	21.59	-1.04	43.79	1.16	0.73	0.14	5.89	-19.13
9	7.80	27.08	0.81	27.72	1.17	0.77	0.25	4.37	-22.84
High MAX	12.20	41.91	5.20	12.93	1.16	0.87	0.74	2.55	-31.73
				Panel B: Index 2					
Low MAX	0.85	3.60	-0.97	383.37	0.18	0.89	0.02	24.90	16.50
2	1.42	5.39	-0.31	646.05	0.44	0.83	0.01	28.19	16.60
3	1.81	6.55	0.62	535.90	0.60	0.79	0.01	27.38	18.71
4	2.17	7.61	1.53	435.12	0.71	0.76	0.01	26.34	20.90
5	2.55	8.72	2.53	360.34	0.81	0.76	0.01	24.59	23.60
6	2.97	9.97	3.63	287.78	0.91	0.76	0.01	22.50	26.80
7	3.48	11.50	4.95	227.53	1.00	0.76	0.02	20.22	30.28
8	4.16	13.47	6.97	182.34	1.11	0.78	0.02	17.63	34.85
9	5.20	16.50	10.41	134.00	1.21	0.80	0.04	14.49	40.89
High MAX	7.67	23.94	21.28	77.04	1.25	0.88	0.12	9.39	51.78

Table 6
Returns and Alphas of Portfolios Sorted by Composite Rank and MAX After Controlling for Size, B/M, MOM, REV, and Illiq

This table reports the value weighted and equal weighted average monthly returns of portfolios in month *t* + 1. Each month *t* we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month *t*. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. Index1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Each month *t*, using separate two portfolios, Index1 and Index2, decile portfolios are formed on the control variables, then within each decile, another decile portfolios are formed on MAX, which is the average of 5 highest maximum daily returns of a stock in month *t*. This table reports average returns across the 10 control decile portfolios. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	Size		B/M		MOM		REV		Illiq	
	Index1	Index2	Index1	Index2	Index1	Index2	Index1	Index2	Index1	Index2
Panel A: Value-Weighted Returns										
Low MAX	1.46	0.85	1.20	0.92	1.17	0.98	0.89	0.71	1.18	0.92
2	1.43	1.14	1.27	1.02	1.19	1.02	1.24	0.87	1.47	1.08
3	1.38	1.20	1.09	1.02	1.00	1.02	1.14	0.94	1.13	1.00
4	1.20	1.25	1.01	0.91	0.91	0.93	0.96	1.02	1.08	1.04
5	1.11	1.27	0.78	1.02	0.65	1.10	0.83	1.15	0.85	0.96
6	0.80	1.17	0.41	1.02	0.31	1.08	0.68	1.12	0.69	0.86
7	0.65	1.19	0.36	1.12	0.19	1.06	0.42	1.11	0.41	1.04
8	0.22	1.22	0.06	1.15	-0.34	0.90	-0.04	1.17	0.06	1.01
9	-0.27	1.14	-0.44	1.20	-0.46	0.87	-0.47	1.12	-0.27	1.11
High MAX	-1.18	0.84	-1.55	0.88	-1.40	0.71	-1.09	0.88	-1.03	0.76
High - Low	-2.63	-0.01	-2.75	-0.04	-2.57	-0.27	-1.98	0.17	-2.21	-0.16
	(-9.79)	(-0.03)	(-8.52)	(-0.15)	(-7.97)	(-1.03)	(-5.48)	(0.58)	(-6.98)	(-0.61)
Alpha	-3.07	-0.47	-3.24	-0.53	-3.17	-0.53	-2.44	-0.30	-2.57	-0.55
	(-13.93)	(-2.41)	(-9.99)	(-2.18)	(-10.18)	(-2.45)	(-8.04)	(-1.29)	(-8.61)	(-2.61)
Panel B: Equal-Weighted Returns										
Low MAX	1.74	1.08	1.63	0.95	1.67	1.08	1.46	0.86	1.69	1.06
2	1.73	1.31	1.69	1.24	1.68	1.36	1.52	1.12	1.73	1.30
3	1.76	1.41	1.56	1.31	1.71	1.34	1.50	1.22	1.74	1.31
4	1.66	1.41	1.42	1.27	1.54	1.40	1.49	1.33	1.60	1.34
5	1.53	1.37	1.34	1.38	1.33	1.36	1.38	1.37	1.47	1.28
6	1.32	1.37	1.06	1.30	1.21	1.43	1.23	1.44	1.33	1.23
7	1.17	1.33	0.99	1.42	1.06	1.36	1.02	1.40	1.06	1.33
8	0.74	1.31	0.69	1.40	0.80	1.34	0.86	1.46	0.76	1.36
9	0.45	1.22	0.46	1.36	0.54	1.23	0.62	1.39	0.69	1.33
High MAX	-0.14	0.80	0.28	0.77	0.40	0.72	1.04	0.94	0.39	0.80
High - Low	-1.89	-0.28	-1.35	-0.18	-1.27	-0.36	-0.42	0.07	-1.30	-0.26
	(-6.49)	(-1.13)	(-4.14)	(-0.73)	(-4.15)	(-1.57)	(-1.99)	(0.31)	(-3.90)	(-1.04)
Alpha	-2.17	-0.76	-1.71	-0.74	-1.77	-0.82	-0.77	-0.49	-1.59	-0.79
	(-7.71)	(-4.23)	(-5.54)	(-3.96)	(-6.14)	(-4.84)	(-2.31)	(-2.80)	(-4.86)	(-4.03)

Table 7
Firm-Level Fama-MacBeth Cross-Sectional Regression

This table reports the results of Fama-MacBeth cross-sectional regression of individual firms' returns in month *t* + 1 on control variables in month *t*. Common stocks from NYSE, AMEX, and NASDAQ with at least 12 daily observations in each moth *t* are included in the regression from January 1965 to December 2013. Each month *t* we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month *t*. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. INDEX1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Ind is an indicator variable that equals 0 (1) for stocks that belong to index1 (2). MAX(1) is the maximum daily return and MAX(5) is the average of the 5 highest maximum daily return for each stock in month *t*. IVOL is idiosyncratic volatility. REV is monthly return in the current month *t*. Size is natural log of market capitalization. Beta is the market beta. B/M is the book-to-market ratio. ILLIQ is illiquidity measure scaled by 100,000. MOM is return from *t* -12 to *t* -1. COSKEW is a measure for coskewness. ISKEW is idiosyncratic skewness. The detailed explanations are provided in the main text. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	MAX(1)				MAX(5)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MAX	-0.041	-0.016	-0.049	-0.056	-0.107	-0.226	-0.123	-0.159
	(-3.83)	(-1.44)	(-4.33)	(-4.22)	(-4.05)	(-4.63)	(-2.67)	(-3.22)
MAX*IND			0.087	0.077			0.074	0.196
			(8.18)	(8.24)			(7.53)	(8.17)
IND			0.257	0.161			0.317	-0.043
			(1.54)	(1.19)			(1.99)	(-0.28)
IVOL		0.007	0.022	0.009		0.058	0.028	0.017
		(0.41)	(1.29)	(0.58)		(4.46)	(2.05)	(1.17)
REV		-0.057	-0.071	-0.074		-0.040	-0.065	-0.069
		(-11.33)	(-14.64)	(-14.52)		(-6.93)	(-11.23)	(-10.37)
SIZE				-0.162				-0.159
				(-4.24)				(-4.01)
BETA				0.016				0.023
				(0.74)				(1.12)
B/M				0.116				0.119
				(2.33)				(2.39)
ILLIQ				0.024				0.024
				(4.14)				(4.22)
MOM				0.478				0.451
				(2.90)				(2.76)
COSKEW				0.101				0.166
				(1.82)				(2.22)
ISKEW				0.149				0.129
				(4.46)				(5.02)

Table 8
Cross-Sectional Correlation Among MAX, IVOL and REV

This table reports average cross-sectional correlation among MAX(N) (N highest maximum daily returns), IVOL (idiosyncratic volatility), and REV (reversal) from January 1965 to December 2013. Stocks from NYSE, AMEX, and NASDAQ with share code 10 or 11 and at least 12 daily observations in each moth *t* are included in the sample. Idiosyncratic volatility is square root of residuals from Fama-French three factor model regression times square root of number of observations in the regression in month *t* when decile portfolios are formed. REV is monthly return for each stock in month *t*.

	No Price Restriction				Price ≥ \$5			
	Max(1)	Max(5)	IVOL	REV	Max(1)	Max(5)	IVOL	REV
Panel A: Average Cross-Sectional Correlation								
Max(1)	1.00	0.89	0.90	0.35	1.00	0.89	0.88	0.44
Max(5)		1.00	0.93	0.40		1.00	0.92	0.51
IVOL			1.00	0.16			1.00	0.23
REV				1.00				1.00
Panel B: Maximum Cross-Sectional Correlation								
Max(1)	1.00	0.95	0.98	0.69	1.00	0.94	0.98	0.87
Max(5)		1.00	0.98	0.79		1.00	0.97	0.83
IVOL			1.00	0.64			1.00	0.79
REV				1.00				1.00
Panel C: Minimum Cross-Sectional Correlation								
Max(1)	1.00	0.84	0.80	-0.31	1.00	0.83	0.78	-0.31
Max(5)		1.00	0.82	-0.25		1.00	0.82	-0.23
IVOL			1.00	-0.60			1.00	-0.60
REV				1.00				1.00

Table 9
Returns and Alphas of Portfolios Sorted by MAX, IVOL, and REV : With and Without $5 Price Restriction

This table reports the value and equal weighted average monthly returns of portfolios in month $t + 1$. We form decile portfolios on the average of the N highest daily returns (MAX(N)), IVOL (idiosyncratic volatility), and REV (reversal) each month t. Idiosyncratic volatility is square root of residuals from Fama-French three factor model regression times square root of number of observations in the regression in month t when decile portfolios are formed. REV is monthly return for each stock in month t when decile portfolios are formed. Stocks from NYSE, AMEX, and NASDAQ with share code 10 or 11 are included in the sample from January 1965 to December 2013. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	Panel A: No Price Restriction				Panel B: Price ≥ $5			
	Max(1)	Max(5)	IVOL	REV	Max(1)	Max(5)	IVOL	REV
Panel A: Value-Weighted Returns of Portfolios								
Low	0.83	0.96	0.82	1.17	0.91	0.96	0.81	0.91
2	0.92	0.95	0.92	0.95	0.92	0.98	0.87	1.06
3	0.91	0.95	0.92	1.15	0.93	0.95	0.99	1.12
4	0.98	0.98	1.03	1.11	0.88	0.98	0.87	1.00
5	0.98	0.95	1.11	1.00	0.99	0.87	1.06	0.93
6	1.06	0.97	1.06	0.89	1.04	0.96	1.09	0.91
7	0.92	1.04	0.92	0.91	0.96	1.01	1.04	0.86
8	0.82	0.64	0.69	0.86	0.85	0.94	0.93	0.88
9	0.51	0.48	0.27	0.77	0.83	0.56	0.55	0.71
High	0.15	-0.07	-0.32	0.61	0.35	0.26	0.05	0.65
High - Low	-0.68	-1.03	-1.14	-0.55	-0.56	-0.70	-0.76	-0.26
	(-2.07)	(-2.87)	(-2.78)	(-2.16)	(-1.87)	(-2.14)	(-2.13)	(-1.20)
Alpha	-0.99	-1.34	-1.49	-0.67	-0.81	-0.97	-1.02	-0.32
	(-3.70)	(-3.92)	(-4.82)	(-2.71)	(-3.73)	(-4.09)	(-4.08)	(-1.50)
Panel B: Equal-Weighted Returns of Portfolios								
Low	1.20	1.21	1.08	3.02	1.12	1.12	1.03	1.55
2	1.32	1.40	1.18	1.48	1.31	1.39	1.19	1.39
3	1.46	1.47	1.31	1.29	1.38	1.40	1.30	1.27
4	1.43	1.50	1.38	1.23	1.37	1.41	1.34	1.22
5	1.42	1.46	1.40	1.19	1.36	1.34	1.37	1.16
6	1.39	1.43	1.38	1.15	1.28	1.27	1.35	1.16
7	1.30	1.37	1.38	1.11	1.19	1.22	1.33	1.04
8	1.28	1.21	1.22	1.01	1.04	1.12	1.14	0.97
9	1.03	0.94	1.06	0.82	0.80	0.77	0.93	0.80
High	0.68	0.52	1.12	0.21	0.25	0.07	0.12	0.53
High - Low	-0.52	-0.69	0.04	-2.81	-0.87	-1.04	-0.91	-1.03
	(-1.76)	(-2.22)	(0.10)	(-9.94)	(-3.43)	(-3.82)	(-3.13)	(-5.51)
Alpha	-0.74	-0.99	-0.25	-3.06	-1.19	-1.41	-1.28	-1.04
	(-2.71)	(-3.46)	(-0.77)	(-8.53)	(-7.02)	(-7.33)	(-6.66)	(-5.65)

Table 10
Returns and Alphas of Portfolios Sorted by Composite Rank, MAX, IVOL, and REV
: With and Without $5 Price Restriction

This table reports the value and equal weighted average monthly returns of portfolios in month $t + 1$. Each month t we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month t. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. INDEX1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Then, decile portfolios are formed on MAX (the average of 5 highest daily returns), IVOL (idiosyncratic volatility), REV(reversal) each month t within each two separate samples of stocks, INDEX1 and INDEX2. Idiosyncratic volatility is square root of residuals from Fama-French three factor model regression times square root of number of observations in the regression in month t when decile portfolios are formed. REV is monthly return for each stock in month t when decile portfolios are formedStocks from NYSE, AMEX, and NASDAQ with share code 10 or 11 are included in the sample from January 1965 to December 2013. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	Panel A: No Price Restriction						Panel B: Price ≥ $5					
	MAX		IVOL		REV		MAX		IVOL		REV	
	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2
	Panel A: Value-Weighted Returns of Portfolios											
Low	1.02	0.89	1.27	0.71	1.25	1.16	1.27	0.85	1.11	0.71	0.79	1.06
2	1.28	0.96	1.17	0.98	1.06	1.08	1.12	0.96	1.18	0.90	0.96	1.11
3	1.11	0.92	1.03	0.91	0.92	1.10	1.12	0.91	1.04	0.89	1.08	0.95
4	1.07	1.03	0.84	0.96	1.19	1.02	1.10	0.95	1.02	0.94	1.28	0.98
5	0.61	0.96	0.78	1.09	1.19	0.95	0.84	0.91	0.91	0.93	0.96	1.01
6	0.63	1.14	0.54	1.22	1.02	0.95	0.72	1.07	0.82	1.13	1.00	0.86
7	0.29	1.20	0.23	1.25	0.93	0.91	0.76	1.13	0.83	1.28	0.93	0.88
8	-0.06	1.14	-0.11	1.19	0.67	0.84	0.42	1.18	0.41	1.21	0.67	0.84
9	-0.39	1.13	-0.56	0.95	0.62	0.91	0.03	1.15	-0.03	1.22	0.72	0.97
High	-1.27	0.84	-0.90	0.95	-0.33	0.90	-0.68	1.12	-0.75	1.07	0.06	0.93
High -	-2.29	-0.06	-2.17	0.24	-1.58	-0.26	-1.95	0.28	-1.86	0.36	-0.72	-0.13
Low	(-6.05)	(-0.19)	(-5.46)	(0.81)	(-5.16)	(-1.14)	(-6.18)	(0.95)	(-5.66)	(1.26)	(-2.90)	(-0.58)
Alpha	-2.74	-0.43	-2.84	-0.12	-1.43	-0.34	-2.42	-0.15	-2.30	-0.07	-0.73	-0.17
	(-7.35)	(-1.64)	(-8.35)	(-0.50)	(-4.36)	(-1.75)	(-8.78)	(-0.65)	(-8.86)	(-0.30)	(-2.71)	(-0.84)

	No Price Restriction						Price >= $5					
	MAX		IVOL		REV		MAX		IVOL		REV	
	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2
Panel B: Equal-Weighted Returns of Portfolios												
Low	1.50	1.01	1.17	0.90	3.93	1.73	1.36	1.07	1.10	0.94	1.56	1.76
2	1.69	1.28	1.39	1.19	2.04	1.47	1.54	1.28	1.33	1.14	1.48	1.44
3	1.57	1.33	1.34	1.25	1.53	1.35	1.48	1.31	1.40	1.25	1.32	1.31
4	1.56	1.37	1.25	1.33	1.29	1.32	1.42	1.32	1.36	1.29	1.26	1.35
5	1.33	1.40	1.20	1.39	1.17	1.34	1.26	1.36	1.26	1.33	1.11	1.31
6	1.22	1.45	1.16	1.50	1.10	1.21	1.11	1.41	1.10	1.44	1.06	1.23
7	1.05	1.43	1.06	1.55	0.89	1.25	0.91	1.40	0.95	1.52	0.92	1.21
8	0.76	1.48	0.93	1.58	0.67	1.21	0.62	1.48	0.74	1.59	0.65	1.20
9	0.64	1.46	0.97	1.48	0.27	1.21	0.18	1.45	0.33	1.51	0.31	1.23
High	0.46	0.88	1.35	0.93	-1.09	1.03	-0.90	1.17	-0.59	1.23	-0.68	1.21
High - Low	-1.04 (-3.29)	-0.13 (-0.53)	0.17 (0.50)	0.03 (0.14)	-5.02 (-16.18)	-0.71 (-4.09)	-2.27 (-9.69)	0.10 (0.40)	-1.70 (-6.68)	0.29 (1.17)	-2.24 (12.41)	-0.55 (-3.32)
Alpha	-1.49 (-4.95)	-0.75 (-3.84)	-0.22 (-0.66)	-0.64 (-3.36)	-5.27 (-11.19)	-0.77 (-4.60)	-2.52 (-12.49)	-0.49 (-2.60)	-1.99 (-9.88)	-0.33 (-1.77)	-2.12 (-10.50)	-0.49 (-3.24)

Table 11
Firm-Level Fama-MacBeth Cross-Sectional Regression
:With $5 Price Restriction

This table reports the results of Fama-MacBeth cross-sectional regression of individual firms' returns in month *t* + 1 on control variables in month *t*. Common stocks from NYSE, AMEX, and NASDAQ with at least 12 daily observations in each moth *t* and price greater than or equal to $5 are included in the regression from January 1965 to December 2013. Each month *t* we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month *t*. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. INDEX1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Index is an indicator variable that equals 0 (1) for stocks that belong to index1 (2). MAX(1) is the maximum daily return and MAX(5) is the average of the 5 highest maximum daily return for each stock in month *t*. IVOL is idiosyncratic volatility. REV is monthly return in the current month *t*. Size is natural log of market capitalization. Beta is the market beta. B/M is the book-to-market ratio. ILLIQ is illiquidity measure scaled by 100,000. MOM is return from *t* -12 to *t* -1. COSKEW is a measure for coskewness. ISKEW is idiosyncratic skewness. The detailed explanations are provided in the main text. Newey-West (1987) adjusted t-statistics are reported in parentheses.

	MAX(1)				MAX(5)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MAX	-0.068	0.022	-0.063	-0.051	-0.173	-0.069	-0.133	-0.201
	(-5.74)	(1.98)	(-5.26)	(-3.55)	(-5.59)	(-1.20)	(-2.43)	(-3.63)
MAX*IND			0.164	0.149			0.413	0.370
			(16.23)	(15.02)			(16.83)	(15.00)
IND			-0.369	-0.616			-0.762	-0.953
			(-3.40)	(-6.70)			(-6.42)	(-9.26)
IVOL		-0.052	-0.043	-0.064		-0.022	-0.044	-0.040
		(-2.64)	(-2.34)	(-4.59)		(-1.99)	(-3.65)	(-3.12)
REV		-0.029	-0.042	-0.052		-0.022	-0.046	-0.048
		(-6.77)	(-11.02)	(-12.85)		(-3.47)	(-7.95)	(-7.94)
Size				-0.128				-0.125
				(-3.51)				(-3.42)
Beta				0.065				0.069
				(2.34)				(2.52)
B/M				0.106				0.111
				(1.96)				(2.06)
ILLIQ				-0.014				-0.014
				(-1.65)				(-1.72)
MOM				0.723				0.683
				(4.86)				(4.62)
Coskew				-0.115				0.038
				(-1.08)				(0.70)
ISKEW				0.072				0.129
				(2.63)				(6.74)

Table 12
Tests of Persistence of Maximum Daily Return Effect

This table reports the average monthly returns of high MAX (firms with highest maximum daily return) – low MAX (firms with lowest maximum daily return) portfolios during the post-holding period from month *t*+2 to month *t*+6 from January 1965 until June 2013. For Panel A and C, decile portfolios are formed on the average of the N highest daily returns (MAX(N)) each month *t*. For Panel B and D, we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO each month *t*. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month *t*. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. INDEX1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Then, decile portfolios are formed on the average of the N highest daily returns (MAX(N)) each month *t* within each two separate samples of stocks, INDEX1 and INDEX2. Common stocks from NYSE, AMEX, and NASDAQ with at least 12 daily observations in each moth *t* and price greater than or equal to $5 are included in the sample. Newey-West (1978) adjusted *t*-statistics are reported in parenthesis

	t+2	*t*+3	*t*+4	*t*+5	*t*+6
Panel A: Portfolio Sorted on MAX(5)					
Panel A.1: Value-weighted Returns					
	-0.35	-0.27	-0.52	-0.20	-0.10
	(-1.08)	(-0.82)	(-1.46)	(-0.62)	(-0.30)
Panel A.2: Equal-weighted Returns					
	-0.42	-0.31	-0.38	-0.31	-0.18
	(-1.52)	(-1.17)	(-1.41)	(-1.14)	(-0.68)
Panel B: Portfolio Sorted on Index and MAX(5)					
Panel B.1: Value-weighted Returns					
INDEX1	-1.01	-0.75	-1.03	-0.45	-0.50
	(-3.05)	(-2.26)	(-3.24)	(-1.40)	(-1.48)
INDEX2	0.22	0.42	0.10	0.03	0.12
	(0.75)	(1.34)	(0.36)	(0.09)	(0.36)
Panel B.2: Equal-weighted Returns					
INDEX1	-1.06	-0.77	-0.66	-0.46	-0.42
	(-4.15)	(-3.14)	(-2.67)	(-1.81)	(-1.67)
INDEX2	0.39	0.36	0.05	0.06	0.21
	(1.59)	(1.53)	(0.27)	(0.25)	(0.74)

Table 13
Returns and Alphas of Portfolios Sorted by Composite Rank, MAX and IVOL With $5 Price Restriction

This table reports the value weighted average monthly returns of portfolios in month *t* + 1. Each month *t* we form decile portfolios based on CGO (capital gains overhang), where 5 portfolios are formed using stocks with negative CGO and another 5 portfolios are formed using positive CGO. Again, we form decile portfolios based on GH (George and Hwang Ratio = current price/52-week high price) each month *t*. Then, we average each stocks' ranking based on CGO and GH and form two portfolios. INDEX1 (2) the lowest (highest) composite ranking group and represents stocks that are overpriced (underpriced). Decile portfolios are formed on MAX (the average of 5 highest daily returns), and IVOL (idiosyncratic volatility), each month t within each two separate samples of stocks, INDEX1 and INDEX2. We classify months into three different (but not mutually exclusive) market states: recessions vs. expansions, high vs. low economic activity states, and during up vs. down markets. Federal Reserve Bank of St. Louis, NBER based recession indicators are used to classify recession and non-recession months. Months with a CFNAI index level greater than 0 is classified as highly economic activate and a CFNAI less than 0 is classified as having low economic activity. We use returns of the S&P 500 index to classify up and down markets. Stocks from NYSE, AMEX, and NASDAQ with share code 10 or 11 are included in the sample from January 1965 to December 2013. Alpha reports 4-factor (market, size, book-to-market, and momentum) alpha. Newey-West (1987) adjusted t-statistics are reported in parentheses.

Panel A: Recession VS. Expansion

	MAX(5)				IVOL			
	RECESSION		EXPANSION		RECESSION		EXPANSION	
	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2
Panel A : Recession vs. Expansion								
Low MAX(N)	1.97	0.64	1.16	0.88	1.43	0.38	1.06	0.77
2	1.10	0.55	1.13	1.03	1.25	0.49	1.16	0.96
3	1.10	0.45	1.12	0.98	1.19	0.58	1.02	0.94
4	0.87	0.70	1.13	1.00	0.78	0.57	1.06	1.00
5	0.62	0.67	0.88	0.95	0.43	0.55	0.99	0.99
6	0.61	0.29	0.74	1.20	0.63	0.16	0.85	1.29
7	0.49	0.08	0.81	1.30	0.28	-0.13	0.92	1.51
8	-0.70	0.02	0.60	1.37	-0.50	0.60	0.56	1.31
9	-0.81	-0.05	0.16	1.35	-0.55	0.33	0.06	1.37
High MAX(N)	-1.98	-0.22	-0.46	1.34	-2.15	-0.76	-0.52	1.37
High - Low	-3.96	-0.86	-1.62	0.46	-3.58	-1.13	-1.58	0.61
	(-4.17)	(-1.09)	(-4.89)	(1.49)	(-3.34)	(-1.47)	(-4.66)	(1.98)
Alpha	-4.27	-0.89	-2.21	-0.11	-3.75	-1.22	-2.18	0.03
	(-7.39)	(-1.78)	(-7.47)	(-0.39)	(-5.49)	(-2.31)	(-7.29)	(0.13)
Panel B: High vs. Low Economic Activity								
	CFNAI < 0		CFNAI > 0		CFNAI < 0		CFNAI > 0	
	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2
Low MAX(N)	1.62	1.00	0.96	0.70	1.41	0.77	0.84	0.66
2	1.35	0.94	0.91	0.97	1.34	0.88	1.02	0.91
3	1.36	0.77	0.90	1.03	1.29	0.79	0.81	0.98
4	1.25	0.95	0.96	0.96	1.29	0.90	0.77	0.98
5	0.95	0.89	0.73	0.92	1.05	0.89	0.78	0.96
6	1.01	0.85	0.45	1.27	1.19	0.92	0.48	1.33
7	1.12	0.94	0.44	1.30	1.08	1.05	0.59	1.49
8	0.61	0.97	0.24	1.38	0.66	1.07	0.18	1.34
9	0.18	0.91	-0.12	1.37	0.20	1.10	-0.23	1.33
High MAX(N)	-0.33	1.03	-1.00	1.21	-0.50	0.84	-0.98	1.29
High - Low	-1.94	0.03	-1.95	0.50	-1.91	0.07	-1.82	0.63
	(-3.70)	(0.06)	(-5.34)	(1.26)	(-3.49)	(0.17)	(-4.74)	(1.62)
Alpha	-2.47	-0.24	-2.64	-0.35	-2.41	-0.28	-2.50	-0.14
	(-5.95)	(-0.92)	(-6.71)	(-0.80)	(-5.83)	(-1.01)	(-6.02)	(-0.33)

Panel C: Up vs. Down Market								
	S&P500 < 0		S&P500> 0		S&P500 < 0		S&P500> 0	
	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2	INDEX1	INDEX2
Low MAX(N)	0.95	0.68	1.50	0.96	0.78	0.52	1.35	0.85
2	0.65	0.83	1.46	1.05	0.95	0.77	1.34	0.99
3	0.85	0.70	1.32	1.06	0.96	0.87	1.10	0.91
4	0.74	1.00	1.35	0.92	0.46	0.89	1.41	0.98
5	0.33	0.77	1.20	1.01	0.33	0.68	1.32	1.11
6	0.25	0.74	1.05	1.31	0.49	0.81	1.05	1.36
7	0.14	0.83	1.21	1.34	0.09	0.71	1.35	1.68
8	-0.30	0.60	0.92	1.59	-0.37	0.76	0.97	1.53
9	-0.72	0.44	0.56	1.66	-1.03	0.52	0.68	1.72
High MAX(N)	-1.75	0.33	0.09	1.68	-1.86	0.12	0.04	1.75
High - Low	-2.70	-0.35	-1.41	0.72	-2.63	-0.39	-1.31	0.90
	(-5.10)	(-0.72)	(-3.67)	(2.09)	(-4.68)	(-0.80)	(-3.33)	(2.65)
Alpha	-3.03	-0.89	-2.59	-0.36	-2.87	-0.81	-2.45	-0.22
	(-5.63)	(-1.48)	(-8.27)	(-1.30)	(-5.23)	(-1.44)	(-7.37)	(-0.76)