Loss Uncertainty, Gain Uncertainty, and Expected Stock Returns

Internet Appendix

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Abstract

We decompose the quadratic payoff on a stock into its loss and gain components and measure the premia associated with their fluctuations, called the loss and gain quadratic risk premium (QRP) respectively. The loss QRP interprets as the premium paid for downside risk hedging, while the gain QRP reads as the premium received for upside risk compensation. Long-short portfolio strategies based on the loss or gain QRP yield monthly risk-adjusted expected excess returns of up to 2.8%. This cross-sectional predictability survives a battery of robustness checks, and is reinforced among stocks experiencing limits to arbitrage, information asymmetry, and demand for lottery.

Keywords: Cross-section of stocks, out-of-the-money options, variance risk premium

JEL Classification: G12

This appendix contains additional results that are omitted from the main text for brevity.

Contents

A Derivations and Definitions

A.1 Risk-Neutral Moments of Gain and Loss from OTM Options

In this section, we prove analytically that $V_t^g(\tau)$ is the price of the quadratic gain, therefore $V_t^l(\tau)$ is the price of the quadratic loss. Consider the function

$$F(X) = \frac{1}{\alpha}\ln\left(1-\delta+\delta\exp(\alpha X)\right)$$

with $0 \leq \delta \leq 1$ and $\alpha > 0$. It can easily be verified that $F(X) = \max(X,0)$ if $\alpha \to \infty$, $0 < \delta < 1$.

Suppose we are interested in computing the risk-neutral moments of the gain component of the τ-period log returns defined by $r_{t,t+\tau} = \ln\left[\frac{S_{t+\tau}}{S_t}\right]$. That is, we want to compute

$$\mathbb{E}_t^{\mathbb{Q}}\left[g_{t,t+\tau}^n\right] \quad \text{for} \quad n \geq 2 \quad \text{where} \quad g_{t,t+\tau} = \max\left(r_{t,t+\tau},0\right).$$

Observe that

$$g_{t,t+\tau}^n = \left(\max\left(r_{t,t+\tau},0\right)\right)^n = \lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} \left(F\left(r_{t,t+\tau}\right)\right)^n.$$

It follows that

$$\mathbb{E}_t^{\mathbb{Q}}\left[g_{t,t+\tau}^n\right] = \lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} \mathbb{E}_t^{\mathbb{Q}}\left[\left(F\left(r_{t,t+\tau}\right)\right)^n\right] \quad \text{for} \quad n \geq 2. \tag{A.1}$$

Remark that $F(0) = 0$ and that F is twice differentiable with

$$F'(X) = \frac{\delta\exp(\alpha X)}{1-\delta+\delta\exp(\alpha X)} = \delta\exp\left(\alpha\left(X-F(X)\right)\right)$$
$$F''(X) = \delta\alpha\left(1-F'(X)\right)\exp\left(\alpha\left(X-F(X)\right)\right) = \alpha\left(1-F'(X)\right)F'(X) = \frac{\alpha\delta(1-\delta)\exp(\alpha X)}{\left(1-\delta+\delta\exp(\alpha X)\right)^2}.$$

Thus we can compute $\mathbb{E}_t^{\mathbb{Q}}\left[\left(F\left(r_{t,t+\tau}\right)\right)^n\right]$ for $n \geq 2$ by applying the Bakshi et al. (2003) formula

$$\begin{aligned}\mathbb{E}_t^{\mathbb{Q}}\left[\exp(-r\tau)H\left(S_{t+\tau}\right)\right] &= \exp(-r\tau)\left(H(S_t) - S_tH'(S_t)\right) + S_tH'(S_t) \\ &\quad + \int_0^{S_t} H''(K)P(t,\tau;K)\,dK + \int_{S_t}^{\infty} H''(K)C(t,\tau;K)\,dK\end{aligned} \tag{A.2}$$

with the twice differentiable function $H(S) = \left(F\left(\ln\left[\frac{S}{S_t}\right]\right)\right)^n$.

We have

$$H'(S) = \frac{nF'\left(\ln\left[\frac{S}{S_t}\right]\right)\left(F\left(\ln\left[\frac{S}{S_t}\right]\right)\right)^{n-1}}{S}$$

and

$$H''(S) = \frac{n\left[\left(F''\left(\ln\left[\frac{S}{S_t}\right]\right) - F'\left(\ln\left[\frac{S}{S_t}\right]\right)\right)F\left(\ln\left[\frac{S}{S_t}\right]\right) + (n-1)\left(F'\left(\ln\left[\frac{S}{S_t}\right]\right)\right)^2\right]\left(F\left(\ln\left[\frac{S}{S_t}\right]\right)\right)^{n-2}}{S^2}.$$

Observe that, since $F(0) = 0$ and $F'(0) = \delta$, for $n \geq 2$ we have

$$H(S_t) = (F(0))^n = 0 \quad \text{and} \quad H'(S_t) = \frac{nF'(0)(F(0))^{n-1}}{S_t} = 0.$$

This means that

$$\exp(-r\tau)\left(H(S_t) - S_t H'(S_t)\right) + S_t H'(S_t) = 0. \tag{A.3}$$

Now, we are interested in computing

$$\lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} H''(K).$$

We have

$$H''(K) = \frac{n\left[(F''(X) - F'(X))F(X) + (n-1)(F'(X))^2\right](F(X))^{n-2}}{K^2} \quad \text{where} \quad X = \ln\left[\frac{K}{S_t}\right].$$

For OTM put options, we have $K < S_t$ or equivalently $X < 0$. Observe from their expressions that when $\alpha \to \infty,\ 0 < \delta < 1$, then $F(X) \to \max(X, 0) = 0$, $F'(X) \to 0$ and also $F''(X) \to 0$. This means that

$$\forall K < S_t \quad \lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} H''(K) = 0$$

and thus

$$\lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} \int_0^{S_t} H''(K)\, P(t,\tau;K)\, dK = \int_0^{S_t} \left(\lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} H''(K) \right) P(t,\tau;K)\, dK \\ = 0. \tag{A.4}$$

For OTM call options, we have $K > S_t$ or equivalently $X > 0$. Observe from their expressions that when $\alpha \to \infty,\ 0 < \delta < 1$, then $F(X) \to \max(X,0) = X,\ F'(X) \to 1$ and $F''(X) \to 0$. This means that

$$\forall K > S_t \quad \lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} H''(K) = \frac{n\left(n-1-\ln\left[\frac{K}{S_t}\right]\right)\left(\ln\left[\frac{K}{S_t}\right]\right)^{n-2}}{K^2}$$

and thus

$$\lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} \int_{S_t}^{\infty} H''(K)\, C(t,\tau;K)\, dK = \int_{S_t}^{\infty} \left(\lim_{\substack{\alpha\to\infty \\ 0<\delta<1}} H''(K) \right) C(t,\tau;K)\, dK \\ = \int_{S_t}^{\infty} \frac{n\left(n-1-\ln\left[\frac{K}{S_t}\right]\right)\left(\ln\left[\frac{K}{S_t}\right]\right)^{n-2}}{K^2} C(t,\tau;K)\, dK. \tag{A.5}$$

Taking the limit of Equation (A.2) when $\alpha \to \infty,\ 0 < \delta < 1$, equations (A.3), (A.4) and (A.5) imply that

$$\mathbb{E}_t^{\mathbb{Q}}\left[\exp(-r\tau)\, g_{t,t+\tau}^n\right] = \int_{S_t}^{\infty} \frac{n\left(n-1-\ln\left[\frac{K}{S_t}\right]\right)\left(\ln\left[\frac{K}{S_t}\right]\right)^{n-2}}{K^2} C(t,\tau;K)\, dK \quad \text{for} \quad n \geq 2. \tag{A.6}$$

Since Bakshi et al. (2003) show that

$$\mathbb{E}_t^{\mathbb{Q}}\left[\exp(-r\tau)\, r_{t,t+\tau}^n\right] = \int_0^{S_t} \frac{n\left(n-1+\ln\left[\frac{S_t}{K}\right]\right)\left(-\ln\left[\frac{S_t}{K}\right]\right)^{n-2}}{K^2} P(t,\tau;K)\, dK \\ + \int_{S_t}^{\infty} \frac{n\left(n-1-\ln\left[\frac{K}{S_t}\right]\right)\left(\ln\left[\frac{K}{S_t}\right]\right)^{n-2}}{K^2} C(t,\tau;K)\, dK \quad \text{for} \quad n \geq 2, \tag{A.7}$$

and given that $r^n_{t,t+\tau} = g^n_{t,t+\tau} + (-1)^n\, l^n_{t,t+\tau}$ where $l_{t,t+\tau} = \max(-r_{t,t+\tau}, 0)$, then it follows that

$$\mathbb{E}^{\mathbb{Q}}_t \left[\exp(-r\tau)\, l^n_{t,t+\tau}\right] = \int_0^{S_t} \frac{n\left(n-1+\ln\left[\frac{S_t}{K}\right]\right)\left(\ln\left[\frac{S_t}{K}\right]\right)^{n-2}}{K^2} P(t,\tau;K)\, dK \quad \text{for} \quad n \geq 2. \tag{A.8}$$

A.2 Measuring Systematic Risk or Firm Characteristics

In this section, we provide details on the measurement of the systematic risk factors and firm characteristics used in the main text.

GDA Factors The five GDA factors depend on two variables: the log market return, r_W, and changes in the market conditional variance, $\Delta\sigma^2_W$. To measure the unobservable market conditional variance, we use the physical conditional expected quadratic payoff. Following Farago and Tédongap (2018, see their Online Appendix), we use short-window regressions to estimate the stocks' exposures to the GDA factors. For every month $t \geq 6$, we use six months of daily data from month $t-5$ to month t to run the following regression:

$$R^e_{i,s} = \alpha_{i,t} + \beta_{iW,t} r_{W,s} + \beta_{iW\mathcal{D},t} r_{W,s} \mathbb{I}(\mathcal{D}_s) + \beta_{i\mathcal{D},t} \mathbb{I}(\mathcal{D}_s) + \beta_{iX,t} \Delta\sigma^2_{W,s} + \beta_{iX\mathcal{D},t} \Delta\sigma^2_{W,s} \mathbb{I}(\mathcal{D}_s) + \varepsilon_{i,s}, \tag{A.9}$$

for each stock i, where $R^e_{i,s}$ is the excess return, $r_{W,s}$ is the market factor, $r_{W,s}\mathbb{I}(\mathcal{D}_s)$ is the market downside factor, $\mathbb{I}(\mathcal{D}_s)$ is the downstate factor, $\Delta\sigma^2_{W,\tau}$ is the volatility factor, $\Delta\sigma^2_{W,\tau}\mathbb{I}(\mathcal{D}_s)$ is the volatility downside factor, s denotes daily observations over the six-month period, t denotes the current month, and $\mathcal{D}_s$ is the downside event defined as $\mathcal{D}_s = \left\{ r_{W,s} - (\sigma_W/\sigma_X)\,\Delta\sigma^2_{W,s} < b \right\}$, where $\sigma_W = Std\left[r_{W,s}\right]$ and $\sigma_X = Std\left[\Delta\sigma^2_{W,s}\right]$ are the standard deviations of market log returns and changes in the market conditional variance, respectively, and where b is chosen to match a downside probability of 16%.

Market Loss or Gain Quadratic Risk Premium To measure a firm's exposure to the market loss or gain QRP, we start with the cross-sectional implications of the general equilibrium asset pricing model proposed by Bollerslev et al. (2009), which features three factors: market excess returns, innovations in the market conditional variance, and innovations in the market variance of variance. Since the model also implies that the market's total VRP is solely determined by the variance of variance, and given the bias in measuring VRP and its components, we substitute the variance of variance factor with the market loss and gain QRPs and measure the firm's exposures to these two market QRP components from the resulting four-factor model. At the end of each month $t \geq 6$, using six months of daily data from month $t-5$ to month t, we run the following regression:

$$R^e_{i,\tau} = \alpha_{i,t} + \beta^m_{i,t} R_{m,\tau} + \beta^{loss}_{i,t} \Delta QRP^b_{m,\tau} + \beta^{gain}_{i,t} \Delta QRP^g_{m,\tau} + \beta^{vix}_{i,t} \Delta VIX^2_{m,\tau} + \varepsilon_{i,\tau}, \tag{A.10}$$

where τ refers to daily observations over this period, $R^e_{i,t}$ and $R_{m,t}$ are firm and market excess returns, respectively, $\Delta VIX^2_{m,\tau}$ are changes in the VIX^2 index, and $\Delta QRP^b_{m,\tau}$ and $\Delta QRP^g_{m,\tau}$ are changes in the market loss and gain QRPs, respectively.

Market Risk-Neutral Skewness A firm's exposure to the market risk-neutral skewness is calculated following Chang et al. (2013), i.e., at the end of each month $t \geq 6$, we run the following regression using six months of daily data from month $t-5$ to month t:

$$R^e_{i,s} = \alpha_{i,t} + \beta^m_{i,t} R_{m,s} + \beta^{skew}_{i,t} \Delta SKEW_{m,s} + \varepsilon_{i,s}, \tag{A.11}$$

where s denotes daily observations over this period, $R^e_{i,s}$ and $R_{m,s}$ are firm and market excess returns, respectively, and $\Delta SKEW_{m,s}$ are changes in the market risk-neutral skewness $SKEW_{m,s}$. Our measure of $SKEW_{m,s}$ is based on option data. Following Bakshi et al. (2003), we define $V_{m,t}(\tau)$, $W_{m,t}(\tau)$, and $X_{m,t}(\tau)$ as the time-t prices of the 30-day quadratic, cubic, and quartic contracts on the S& P 500 index, respectively, and r denotes the risk-free rate. Bakshi et al. show that the risk-neutral skewness can be calculated as

$$SKEW_{m,t}(\tau) = \frac{e^{r\tau} W_{m,t}(\tau) - 3\mu_{m,t}(\tau)\, e^{r\tau} V_{m,t}(\tau) + 2\mu_{m,t}(\tau)^3}{\left[e^{r\tau} V_{m,t}(\tau) - \mu_{m,t}(\tau)^2\right]^{3/2}}, \tag{A.12}$$

where $\mu_{m,t}(\tau) = e^{r\tau} - 1 - e^{-r\tau} V_{m,t}(\tau)/2 - e^{-r\tau} W_{m,t}(\tau)/6 - e^{-r\tau} X_{m,t}(\tau)/24$.

Implied Volatility Smirk For each firm in our sample, we compute the implied volatility smirk following Xing et al. (2010) and Yan (2011) as the difference between the implied volatility of out-of-the-money (OTM) puts and at-the-money (ATM) calls. That is,

$$SKEW_{i,t} = VOL_{i,t}^{OTMP} - VOL_{i,t}^{ATMC} \tag{A.13}$$

Firm Risk-Neutral Skewness Our measure of firm-level skewness is based on option data. Following Bakshi et al. (2003), we define $V_{i,t}(\tau)$, $W_{i,t}(\tau)$, and $X_{i,t}(\tau)$ as the time-t prices of the 30-day quadratic, cubic, and quartic contracts on the underlying asset i, respectively, and r denotes the risk-free rate. Bakshi et al. show that the risk-neutral skewness can be calculated as

$$FSKEW_{i,t}(\tau) = \frac{e^{r\tau} W_{i,t}(\tau) - 3\mu_{i,t}(\tau) e^{r\tau} V_{i,t}(\tau) + 2\mu_{i,t}(\tau)^3}{\left[e^{r\tau} V_{i,t}(\tau) - \mu_{i,t}(\tau)^2\right]^{3/2}}, \tag{A.14}$$

where $\mu_{i,t}(\tau) = e^{r\tau} - 1 - e^{-r\tau} V_{i,t}(\tau)/2 - e^{-r\tau} W_{i,t}(\tau)/6 - e^{-r\tau} X_{i,t}(\tau)/24$.

Relative Signed Jump Variation For each firm in our sample, we measure the relative signed jump variation following Bollerslev et al. (forthcoming) as:

$$RSJ_{i,t} = \frac{RV_{i,t}^{g} - RV_{i,t}^{b}}{RV_{i,t}}. \tag{A.15}$$

We compute this measure for each day t. To obtain a monthly RSJ, we follow Bollerslev et al. (forthcoming) and take the average daily RSJ within each month.

Idiosyncratic Volatility Following Ang et al. (2006), we estimate a firm's idiosyncratic volatility for month t, $IVOL_{i,t}$, from the daily time series regression:

$$R_{i,s}^{e} = \alpha_{i,t} + \beta_{i,t}^{m} MKT_s + \beta_{i,t}^{smb} SMB_s + \beta_{i,t}^{hml} HML_s + \varepsilon_{i,s}, \tag{A.16}$$

where s refers to daily observations over month t, $R_{i,s}^{e}$ and MKT_s are firm and market excess returns, and SMB_s and HML_s are the size and the value factor, respectively. Thus, we have:

$$IVOL_{i,t} = \sqrt{\frac{1}{|D_{i,t}| - 1} \sum_{s \in D_{i,t}} \varepsilon_{i,s}^2}. \tag{A.17}$$

where $D_{i,t}$ is the set of days for which relevant data are available for stock i in month t, $|D_{i,t}|$ is the cardinality of $D_{i,t}$.

Stock Illiquidity We follow Amihud (2002) and measure the stock illiquidity as:

$$ILLIQ_{i,t} = \frac{1}{|D_{i,t}|} \sum_{s \in D_{i,t}} \frac{|r_{i,s}|}{VOLD_{i,s}}, \tag{A.18}$$

where $D_{i,t}$ is the set of days for which relevant data are available for stock i in month t, $|D_{i,t}|$ is the cardinality of $D_{i,t}$, $|r_{i,s}|$ is the daily absolute return of stock i, and $VOLD_{i,s}$ its dollar volume.

Option Illiquidity We follow Goyenko et al. (2015) and compute the daily option illiquidity as the dollar-volume-weighted average of the relative option quoted spreads. They use intra-daily National Best Bid and Offer (NBBO) quotes to compute the relative quoted spread obtained from the Transactions and Quotes database of the NYSE, while we use end-of-day data from OptionMetrics.

B Additional Results

B.1 S&P 500 Realized Autocovariance and Intraday Returns

In Figure B1, we compute the realized autocovariance and the standardized realized autocovariance for the S&P 500 using intraday 5-min returns. For the computation of the realized variance we also include overnight returns. Using intraday returns, we find the same conclusion as in the main text: the S&P 500 realized autocovariance is not negligible.

B.2 Option Illiquidity, Volatility Spread and the Quadratic Risk Premium

We use double-sorting strategies to examine whether the asset pricing information in two other option-based firm characteristics already account for the pricing information embedded in the firm QRP components. These are option illiquidity defined as in Goyenko et al. (2015), and the volatility spread (VS) defined as in Bali and Hovakimian (2009) and Cremers and Weinbaum (2010): the difference between call and put implied volatilities. Table B1 presents results when we sort stocks by their QRP components and control for these two stock characteristics. All reported “5-1” spreads are statistically significant at the 95% or higher confidence level.

B.3 Cross-Sectional Regressions Different Horizons

In Tables B2-B5, we run month-by-month cross-sectional regressions for 3 or 12 months holding period. We include the same set of systematic risk factor exposures and firm characteristics as in Tables 6 and 7 in the main paper. Compared to the results in the main paper, we find that the coefficients for loss (gain) QRP decrease by up to 44.8% (56.2%) at the quarterly horizon, but are still highly statistically significant with the lowest t-statistic equal to 7.82 (7.32). Further, we also find that the coefficients for loss (gain) QRP decrease by up to 70.1% (87.4%) at the yearly horizon, but are still highly statistically significant with the lowest t-statistic equal to 9.49 (3.43). In summary, we find that the loss and gain QRP are still able to explain the cross-sectional variations of the excess returns when we extend the holding period from one month to one quarter or one year albeit with decreased power.

B.4 Robustness Checks

In this section we present results for a range of robustness checks. In Table B6, we present single-sorting results for two subsample analysis: one excludes the recent financial crisis (January 1996 - December 2006), and another excludes the IT-crisis (January 2003 - December 2015). In Tables B7-B9, we present single-sorting results for three other measures: two standardized measures of QRP (by the physical or risk-neutral expected quadratic payoff, respectively), and the potentially biased variance risk premium and its loss and gain components. In Table B10, we present single-sorting results for the subsample of dividend and no-dividend paying stocks. In Tables B11 and B12, we present single-sorting results for three subsamples by the firm size: the bottom 30%, the middle 40% and the top 30%. All our main results hold throughout these robustness checks.

Finally, in Table B13 we present conditional triple-sorting results when we first sort stocks into tercile portfolios by their book-to-market ratios. Within each book-to-market tercile portfolio in Panel A (B), we next sort stocks by their gain QRPs (loss QRPs) into tercile portfolios. Finally, within each of these nine portfolios, we sort stocks by their loss QRPs (gain QRPs). We find that the loss QRP has the strongest return predictability among value firms (high book-to-market) , and the gain QRP has the highest return predictability among growth firms (low book-to-market).

B.5 Different Waiting Periods

We also examine the robustness of our findings to different trading strategies based on the loss and gain QRP. The portfolio formation strategies follow Jegadeesh and Titman (1993) and are based on an estimation period of L months, a waiting period of M months, and a holding period of N months, together forming the L/M/N strategy. The main results in our paper are based on the 1/0/1 strategy. In Table B14, we report average excess returns and alphas for the 1/1/1 and 1/3/1 strategy, in which we form value-weighted quintile portfolios based on their average loss or gain QRP in month $t-1$ or month $t-3$, respectively, and then we measure the portfolio excess returns over month $t+1$. For the loss QRP sorted portfolio, we see that the 5-1 alpha of strategy 1/1/1 (1/3/1) decreases from 2.79% in the main paper to 1.91% (1.82%) per month, but it is still highly statistically significant with a t-statistic of 5.19 (5.58). Similarly, for the gain QRP sorted portfolios, we see that the 5-1 alpha of strategy 1/1/1 (1/3/1) decreases from 2.78% in the main paper to 2.26% (1.52%) per month, but it is still highly statistically significant with a t-statistic of 6.30 (4.16).[1]

B.6 Microcaps

In Tables B11 and B12, we present single-sorting results for three subsamples by the firm size: the bottom 30%, the middle 40% and the top 30%. While our main results hold across different firm sizes, we see that our results are strongest among smaller firms. To further examine whether our results are driven by small firms or microcaps stocks, in Table B15 we keep only firms with price larger than 5 USD at the beginning of month t. We find almost unchanged 5-1 alphas for the loss and gain QRP when discarding these microcaps stocks. Taken together with the results of firm size, we can conclude that our main results are not driven by microcaps.

In Figure B2, we also plot the distribution of market capitalization of all firms in our sample at

[1]We also investigate the robustness of our cross-sectional Fama-MacBeth regressions to different waiting periods. In Tables B16 to B19 we run cross-sectional regressions of month $t+1$ firm excess returns on month $t-1$ or $t-3$ estimated betas, controlling for systematic risk factor exposures and firm characteristics. The estimated risk prices for the loss and gain QRP decrease as the waiting period increases, but they are always highly statistically significant. Further, the estimated coefficients imply that a one-standard-deviation increase in the loss (gain) QRP is associated with a 0.6%-1.4% (0.5%-1.1%) rise in monthly expected stock returns.

the start (Jan. 1996) and end (Dec. 2015) of our sample, as well as during the IT-crisis (November 2001), and the month of the Lehman Brothers bankruptcy (September 2008). We see that our sample covers a wide range of firm size.

B.7 Complete Double-Sort Results

In the main text, for the double-sorting strategies we focus exclusively on the "5-1" spreads based on the loss or gain QRP. In this subsection, we present the complete double-sort strategy results corresponding to these "5-1" spreads. These results can be found in Tables B20-B27.

B.8 Loss and Gain Quadratic Risk Premium

To investigate whether the loss and gain QRPs contain different information about the cross-section of expected stock returns, we conduct unconditional double sorts where we first separately sort stocks into quintiles based on the loss and gain QRPs, and then take the intersection of these quintiles. In Table B28, we see that the two QRP components are relatively orthogonal to each other. All reported "5-1" spreads are statistically significant at the 95% or higher confidence level. However, we do not find a monotonic pattern in the predictability of loss (gain) QRP among gain (loss) quintiles.

B.9 Nonsynchronicity of Option and Stock Markets

Our measures of loss (gain) QRP are in part estimated from closing bid and closing ask option quotes. The documented predictability of the loss (gain) QRP may simply be driven by nonsynchronicity. On most days, Option markets close at 4:02PM Eastern Standard Time (EST), while stock exchanges close at 4:00PM EST.[2] As a result, there is at a minimum 2-minute gap between the last stock transaction and the last recorded options quotes in the same day. Battalio and Schultz (2006) show that this nonsynchronicity leads to spurious predictability. OptionMetrics acknowledge this issue and adjust the record of the-end-of-day quotes at 3:59pm EST after March 5th 2008.[3] Therefore, to investigate whether our main results are driven by nonsynchronicity, we

[2]The closing time of the Chicago Board Options Exchange (CBOE) market for options on individual stocks was 4:10PM EST until June 22, 1997.

[3]After March 5th 2008, OptionMetrics defines closing bid (ask) at 3:59PM EST across all exchanges on which the option trades. Thus, after this date there are no nonsynchronicity problems present in the OptionMetrics data.

limit the sample to April 2008 to December 2015. In Table B29, we see that the monthly alpha on the 5–1 portfolio of loss (gain) QRP decreases to 2.32% (2.16%), but it is still highly significant with a t-statistic of 3.11 (4.13). Since these numbers are comparable with the sample without IT crisis in B6. This means that our predictability is unlikely driven by the nonsynchronicity issue.

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Figure B1: S&P 500 Quadratic Payoff, Realized Variance, and Realized Autocovariance (Intraday Returns)

In Panels A and B of this figure, we plot the time-series of the S&P 500 realized autocovariance (RA) and standardized realized autocovariance, respectively. In Panel C, we plot the quadratic loss (QL) and loss realized variance (RV), while in Panel D we plot the quadratic gain (QG) and the gain RV. Realized autocovariance and standardized realized autocovariance are defined as following:

$$RA = \frac{r^2 - RV}{2}, \; Std\ RA = \frac{r^2 - RV}{r^2 + RV}.$$

where r^2 is the quadratic payoff computed as the squared sum of intraday 5-min returns and overnight returns within each month. RV is the realized variance computed as the sum of intraday squared 5-min returns and overnight returns within each month. We obtain the expression for RA by solving for it in Equation 6 from the main paper. Standardized realized covariance multiplied by 100 yields the percentage of equity uncertainty represented by RA. Realized autocovariance, and all measures of the quadratic payoff and realized variance are in monthly squared percentage terms. The sample period is from January 1996 to December 2015.

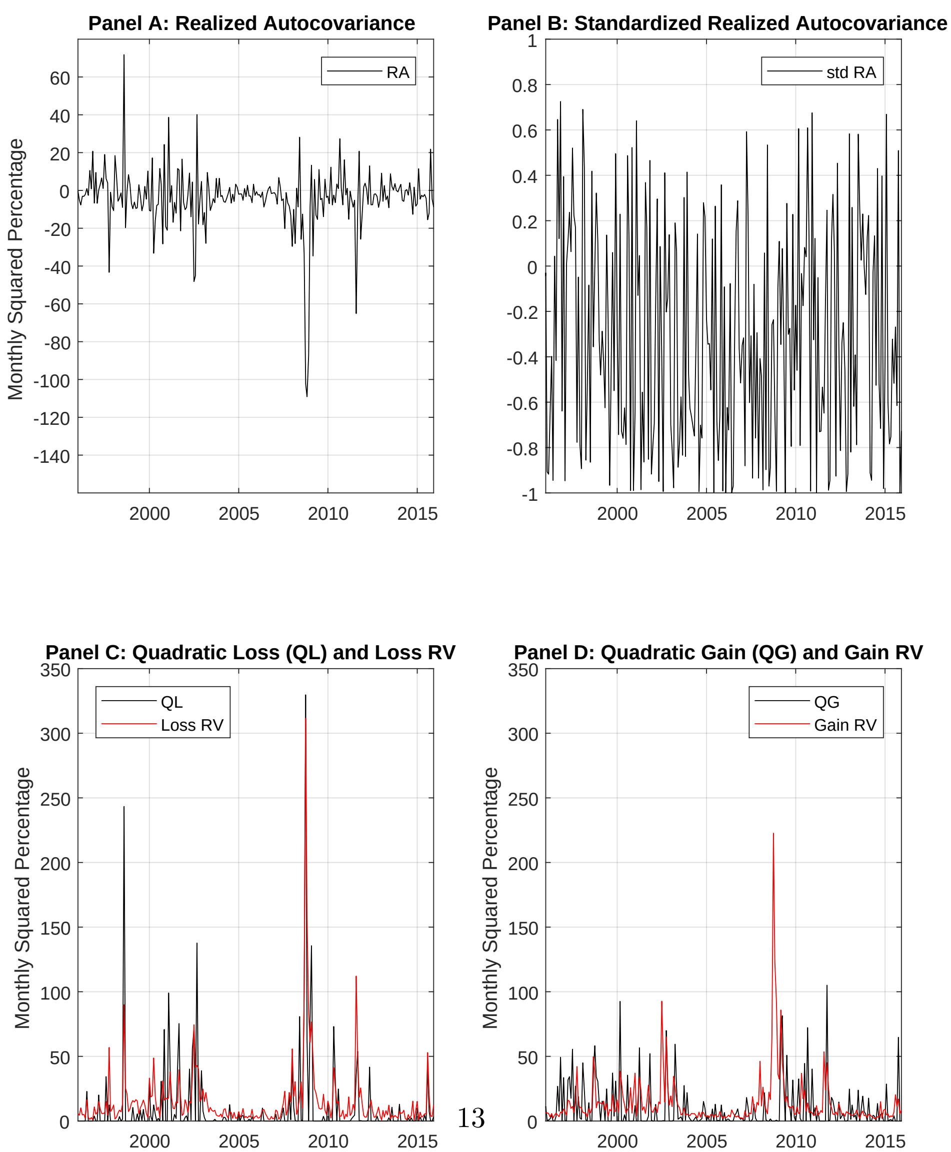

Figure B2: Distribution of Market Capitalization

In this figure, we plot the distribution of market capitalization across firms during January 1996 and December 2015, respectively. We also plot the market capitalization distribution during two crises in our sample. One month at the end of the NBER-defined recession related to the IT-crisis (November 2001), and the second the month of the Lehman Brothers bankruptcy (September 2008). The values in the x-axis are in USD millions. We also report the minimum, maximum, 5th, and 95th quantiles of the average of market capitalization. There are 5150 firms in our sample.

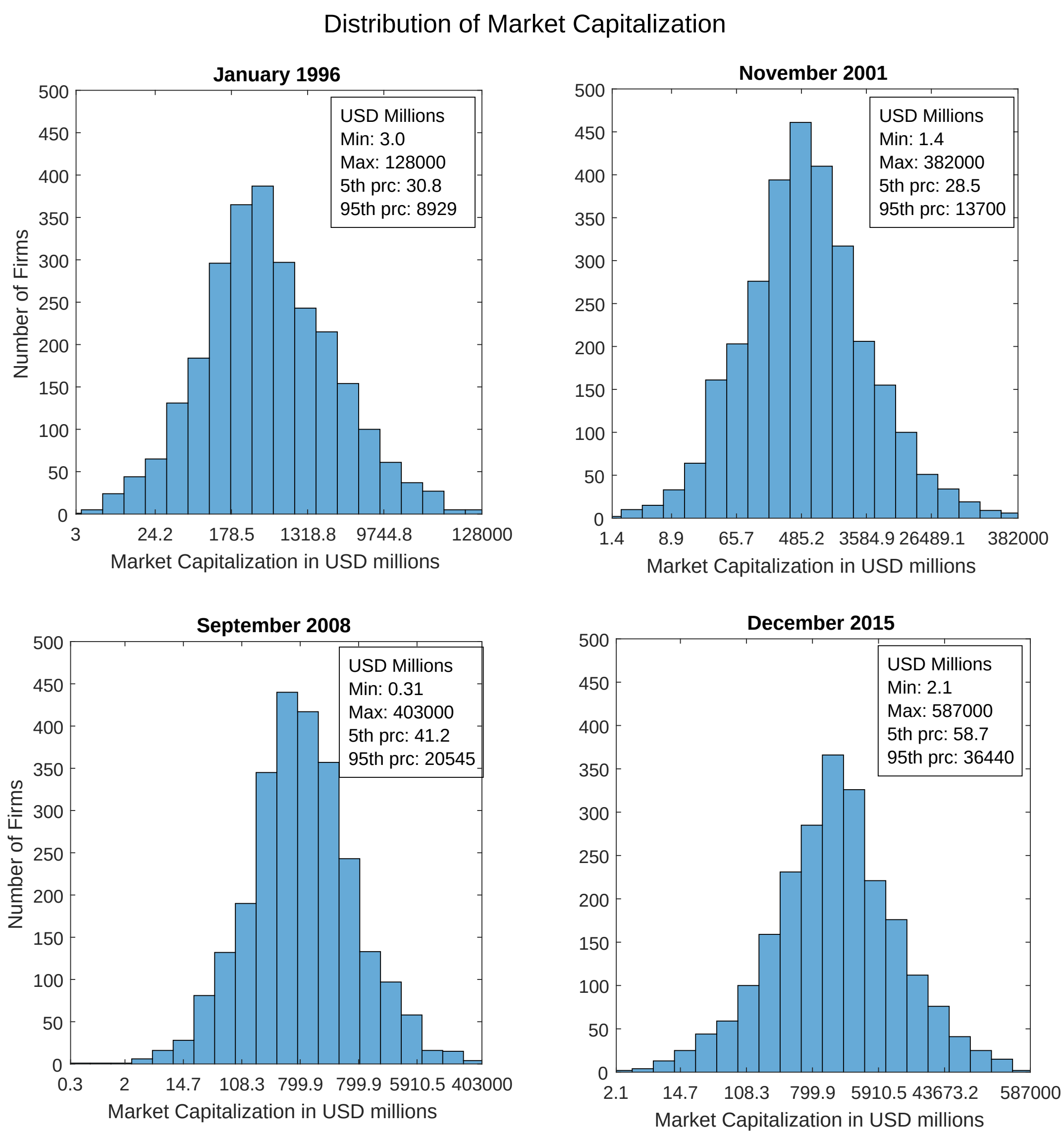

Table B1: Conditional Double Sorts: Option Illiquidity, Volatility Spread and QRP

In Panel A and B, stocks are sorted every month in quintiles based on option illiquidity defined as in Goyenko, Ornthanalai and Tang (2015). In Panel C and D, stocks are sorted every month in quintiles based on the volatility spread (VS) defined as in Bali and Hovakimian (2009) and Cremers and Weinbaum (2010): the difference between call and put implied volatilities. Then, stocks within each quintile of option illiquidity or VS are further sorted in quintiles based on their loss QRP in Panel A and C, and gain QRP in Panel B and D. The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintile. We also report the difference in average excess returns between the top and the bottom quintile (5-1). t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. The sample period is from January 1996 to December 2015.

Panel A: Option Illiquidity and Loss QRP

		Option Illiquidity						
		1	2	3	4	5	5-1	
Loss QRP	1	-1.48	-1.02	-1.34	-1.39	-1.17	0.31	(0.96)
	2	0.25	-0.25	-0.16	-0.12	0.08	-0.16	(-0.93)
	3	0.58	0.74	0.39	0.73	0.81	0.23	(1.20)
	4	0.97	0.84	0.81	1.16	0.95	-0.02	(-0.09)
	5	1.85	1.18	1.76	1.88	1.88	0.03	(0.09)
	5-1	3.33	2.20	3.10	3.27	3.04		
		(**7.46**)	(**4.41**)	(**5.35**)	(**5.85**)	(**5.95**)		

Panel B: Option Illiquidity and Gain QRP

		Option Illiquidity						
		1	2	3	4	5	5-1	
Gain QRP	1	-1.45	-1.70	-1.14	-0.99	-1.54	-0.09	(-0.33)
	2	-0.22	0.01	-0.03	-0.20	-0.13	0.09	(0.48)
	3	0.42	0.19	0.39	0.42	0.58	0.16	(0.93)
	4	0.85	0.75	0.44	0.73	0.69	-0.16	(-0.71)
	5	2.46	1.49	1.50	1.27	2.22	-0.24	(-0.70)
	5-1	3.91	3.19	2.64	2.26	3.76		
		(**7.87**)	(**6.08**)	(**5.35**)	(**5.16**)	(**7.51**)		

Panel C: Volatility Spread and Loss QRP

		Volatility Spread						
		1	2	3	4	5	5-1	
Loss QRP	1	-2.77	-1.90	-0.92	-0.65	-1.54	1.23	(**2.97**)
	2	-0.66	-0.39	-0.12	0.09	0.26	0.92	(**3.03**)
	3	0.19	0.30	0.32	0.66	1.01	0.82	(**2.19**)
	4	0.95	0.88	0.87	1.01	1.84	0.89	(**2.66**)
	5	1.45	1.46	1.29	1.50	2.10	0.65	(1.31)
	5-1	4.22	3.36	2.21	2.15	3.64		
		(**6.53**)	(**6.17**)	(**4.85**)	(**4.60**)	(**6.95**)		

Panel D: Volatility Spread and Gain QRP

		Volatility Spread						
		1	2	3	4	5	5-1	
Gain QRP	1	-2.46	-1.58	-1.33	-0.70	-1.41	1.05	(**2.29**)
	2	-0.76	-0.46	-0.10	-0.07	-0.08	0.67	(**2.35**)
	3	-0.05	0.31	0.19	0.77	0.98	1.04	(**2.75**)
	4	0.24	0.20	0.48	0.83	0.89	0.64	(1.65)
	5	1.65	1.10	1.21	1.22	2.98	1.33	(**2.83**)
	5-1	4.11	2.68	2.54	1.92	4.39		
		(**7.34**)	(**6.01**)	(**5.67**)	(**4.94**)	(**6.09**)		

Table B2: Quarterly Fama-MacBeth Regressions Controlling for Systematic Risk

This table reports the time-series average of the monthly estimated coefficients for different factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In each regression from III to VII we include the firm loss and gain quadratic risk premium with different factor models: CAPM, market skewness factor model (Chang, Christoffersen and Jacobs; 2013), market quadratic risk premium model (Bollerslev, Tauchen and Zhou; 2009), Carhart four-factor model, and the GDA five-factor model (Farago and Tédongap; 2018), respectively. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. In the first step, we regress six months of daily excess returns of the 5150 firms on the different factor models to obtain their respective betas. In the second step, we run cross-sectional regressions of month $t+3$ firm excess returns against the estimated betas and firm quadratic risk premium of month t. t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

I		II		III		IV		V		VI		VII	
Cst	7.5e-4	Cst	-2.4e-4	Cst	1.8e-3	Cst	1.7e-3	Cst	1.8e-3	Cst	1.4e-3	Cst	2.4e-3
	(0.38)		(-1.29)		(0.84)		(0.88)		(0.82)		(0.58)		(1.24)
QRP	0.08	QRP^l	0.34	QRP^l	0.34	QRP^l	0.34	QRP^l	0.35	QRP^l	0.35	QRP^l	0.35
	(1.92)		(**7.82**)		(**9.90**)		(**10.70**)		(**11.03**)		(**8.28**)		(**10.09**)
		QRP^g	0.59	QRP^g	0.63	QRP^g	0.64	QRP^g	0.64	QRP^g	0.63	QRP^g	0.65
			(**7.32**)		(**10.99**)		(**10.76**)		(**11.25**)		(**14.77**)		(**11.75**)
				$\beta_{m,CAPM}$	-2.5e-3	$\beta_{m,SKEW}$	-2.5e-3	$\beta_{m,BTZ}$	-2.4e-3	$\beta_{m,CH}$	-1.9e-3	$\beta_{m,W}$	-2.9e-3
					(-0.24)		(-0.58)		(-0.13)		(-1.69)		(-0.80)
						β_{MSKEW}	0.06	β_{MQRP^l}	-2.6e-6	β_{smb}	-2.1e-3	β_X	7.2e-6
							(1.20)		(-0.58)		(**-2.33**)		(**4.34**)
								β_{MQRP^g}	1.1e-6	β_{hml}	-1.6e-5	$\beta_{\boldsymbol{D}}$	0.13
									(1.11)		(-0.02)		(**2.61**)
								β_{VIX}	1.5e-7	β_{mom}	-1.0e-3	$\beta_{W\boldsymbol{D}}$	-2.9e-3
									(0.03)		(-0.63)		(**-3.76**)
												$\beta_{X\boldsymbol{D}}$	6.8e-6
													(**3.06**)
Adj. R^2	0.62		1.59		4.99		5.41		6.22		8.78		6.53

Table B3: Quarterly Fama-MacBeth Regressions Controlling for Other Firm Characteristics

This table reports the time-series average of the monthly estimated coefficients for factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In regression VIII we include the firm loss and gain quadratic risk premium with the relative signed jump variation (RSJ) from Bollerslev, Li and Zhao (forthcoming). In regression IX we include the firm loss and gain quadratic risk premium with all the firm characteristics: RSJ, idiosyncratic volatility ($IVOL$) computed as in Ang, Hodrick, Xing and Zhang (2006), past 1-month cumulative excess return (P01M), past 12-month cumulative excess return (P12M), size, book-to-market (B/M), illiquidity ($ILLIQ$), risk-neutral skewness ($FSKEW$), the loss and gain realized semi-variances (RV^l and RV^g), and firm risk neutral skewness. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. We run cross-sectional regressions of month $t+3$ firm excess returns against firm characteristics and firm quadratic risk premium of month t. t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

I		II		VIII		IX	
Cst	3.5e-4	Cst	-2.7e-3	Cst	-2.8e-3	Cst	-0.02
	(0.38)		(-1.29)		(-1.65)		(-1.23)
QRP	0.08	QRP^l	0.34	QRP^l	0.34	QRP^l	0.51
	(1.92)		(**7.82**)		(**7.99**)		(**11.16**)
		QRP^g	0.59	QRP^g	0.60	QRP^g	0.75
			(**7.32**)		(**7.31**)		(**6.92**)
				RSJ	-4.0e-3	RSJ	-4.6e-3
					(-1.66)		(-1.71)
						$IVOL$	-0.19
							(**-2.74**)
						P01M	0.04
							(**6.19**)
						P12M	1.4e-3
							(0.68)
						Size	7.7e-4
							(1.27)
						B/M	0.01
							(**1.95**)
						ILLIQ	-0.20
							(-1.49)
						RV^l	0.22
							(**5.87**)
						RV^g	-0.25
							(**-7.68**)
						$FSKEW$	0.01
							(**6.20**)
Adj. R^2	0.62		1.59		2.33		8.57

Table B4: Yearly Fama-MacBeth Regressions Controlling for Systematic Risk

This table reports the time-series average of the monthly estimated coefficients for different factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In each regression from III to VII we include the firm loss and gain quadratic risk premium with different factor models: CAPM, market skewness factor model (Chang, Christoffersen and Jacobs; 2013), market quadratic risk premium model (Bollerslev, Tauchen and Zhou; 2009), Carhart four-factor model, and the GDA five-factor model (Farago and Tédongap; 2018), respectively. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. In the first step, we regress six months of daily excess returns of the 5150 firms on the different factor models to obtain their respective betas. In the second step, we run cross-sectional regressions of month $t+12$ firm excess returns against the estimated betas and firm quadratic risk premium of month t. t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

I		II		III		IV		V		VI		VII	
Cst	1.3e-3	Cst	4.3e-4	Cst	3.9e-5	Cst	-1.3e-5	Cst	3.7e-4	Cst	7.2e-4	Cst	-2.1e-4
	(0.62)		(0.20)		(0.10)		(-0.00)		(0.09)		(0.21)		(-0.05)
QRP	0.09	QRP^l	0.18	QRP^l	0.18	QRP^l	0.18	QRP^l	0.19	QRP^l	0.18	QRP^l	0.19
	(**5.71**)		(**9.49**)		(**12.72**)		(**13.01**)		(**10.60**)		(**9.35**)		(**11.41**)
		QRP^g	0.17	QRP^g	0.20	QRP^g	0.19	QRP^g	0.19	QRP^g	0.22	QRP^g	0.19
			(**3.43**)		(**3.58**)		(**3.09**)		(**3.77**)		(**3.59**)		(**3.36**)
				$\beta_{m,CAPM}$	-4.1e-4	$\beta_{m,SKEW}$	-6.1e-5	$\beta_{m,BTZ}$	-1.1e-4	$\beta_{m,CH}$	-4.3e-4	$\beta_{m,W}$	5.5e-4
					(-0.20)		(-0.03)		(-0.05)		(-0.26)		(0.24)
						β_{MSKEW}	0.06	β_{MQRP^l}	-5.6e-7	β_{smb}	-1.0e-3	β_X	-3.1e-6
							(0.82)		(-0.06)		(-1.68)		(-0.59)
								β_{MQRP^g}	-4.6e-7	β_{hml}	-8.4e-4	$\beta_{\boldsymbol{D}}$	-0.06
									(-0.82)		(-1.05)		(-1.43)
								β_{VIX}	7.4e-6	β_{mom}	-2.1e-3	$\beta_{W\boldsymbol{D}}$	3.6e-4
									(1.64)		(**-2.23**)		(0.41)
												$\beta_{X\boldsymbol{D}}$	-2.3e-6
													(-1.00)
Adj. R^2	0.49		1.04		3.43		3.80		4.46		6.33		4.47

Table B5: Yearly Fama-MacBeth Regressions Controlling for Other Firm Characteristics

This table reports the time-series average of the monthly estimated coefficients for factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In regression VIII we include the firm loss and gain quadratic risk premium with the relative signed jump variation (RSJ) from Bollerslev, Li and Zhao (forthcoming). In regression IX we include the firm loss and gain quadratic risk premium with all the firm characteristics: RSJ, idiosyncratic volatility ($IVOL$) computed as in Ang, Hodrick, Xing and Zhang (2006), past 1-month cumulative excess return (P01M), past 12-month cumulative excess return (P12M), size, book-to-market (B/M), illiquidity ($ILLIQ$), risk-neutral skewness ($FSKEW$), the loss and gain realized semi-variances (RV^l and RV^g), and firm risk neutral skewness. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. We run cross-sectional regressions of month $t + 12$ firm excess returns against firm characteristics and firm quadratic risk premium of month t. t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

I		II		VIII		IX	
Cst	1.3e-3	Cst	4.3e-4	Cst	5.4e-4	Cst	0.01
	(0.62)		(0.20)		(0.26)		(0.73)
QRP	0.09	QRP^l	0.18	QRP^l	0.17	QRP^l	0.27
	(**5.71**)		(**9.49**)		(**9.47**)		(**10.81**)
		QRP^g	0.17	QRP^g	0.18	QRP^g	0.31
			(**3.43**)		(**3.48**)		(**6.68**)
				RSJ	2.3e-3	RSJ	5.0e-4
					(1.14)		(0.29)
						$IVOL$	-0.16
							(-1.56)
						P01M	0.01
							(1.48)
						P12M	-1.3e-3
							(-1.48)
						Size	-2.9e-4
							(-0.46)
						B/M	-1.1e-3
							(-0.44)
						ILLIQ	-0.15
							(-1.26)
						RV^l	0.12
							(**3.25**)
						RV^g	-0.01
							(-0.17)
						$FSKEW$	3.0e-3
							(**3.61**)
Adj. R^2	0.49		1.04		1.52		6.43

Table B6: Univariate Sorts on Loss and Gain QRP excluding Crises

In Panel A and C, at the end of month t we sort firms into quintiles based on their average loss QRP (QRP^l) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. Similarly, in Panel B and D, we sort firms based on their average gain QRP (QRP^g). We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. QRP is reported in monthly square percentage units. In Panel A and B, we focus on the sample period excluding the financial crisis that runs from January 1996 until December 2006. While in Panel C and D, we focus on the sample period excluding the IT-crisis that runs from January 2003 until December 2015.

Excluding IT-Crisis

Panel A: Firm Loss QRP	Quintiles						Panel B: Firm Gain QRP	Quintiles					
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
QRP^l	-85.08	10.56	28.66	54.11	203.01		QRP^g	-43.24	2.66	15.27	33.67	127.76	
$\mathbb{E}[r]$	-0.61	0.28	0.56	0.78	1.45	2.05		-0.59	0.15	0.61	0.74	1.46	2.04
	(-1.17)	(0.91)	(1.49)	(1.66)	(**2.45**)	(**5.02**)		(-1.37)	(0.42)	(1.65)	(1.68)	(**2.49**)	(**6.10**)
alpha	-1.45	-0.35	-0.21	-0.15	0.38	1.83		-1.35	-0.53	-0.11	-0.14	0.37	1.72
	(**-5.70**)	(**-4.81**)	(**-2.52**)	(-1.24)	(1.66)	(**4.27**)		(**-8.56**)	(**-5.84**)	(-1.18)	(-1.12)	(1.75)	(**5.74**)

Excluding Financial Crisis

Panel C: Firm Loss QRP	Quintiles						Panel D: Firm Gain QRP	Quintiles					
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
QRP^l	-190.43	3.84	32.24	72.59	235.44		QRP^g	-70.30	-6.97	12.49	41.48	189.26	
$\mathbb{E}[r]$	-1.81	-0.26	0.65	1.27	2.10	3.90		-1.75	-0.46	0.53	0.36	1.72	3.47
	(**-3.14**)	(-0.65)	(1.54)	(**2.15**)	(**2.82**)	(**6.83**)		(**-2.95**)	(-1.19)	(1.43)	(0.69)	(**2.56**)	(**7.07**)
alpha	-2.41	-0.85	0.23	0.83	1.50	3.90		-2.28	-1.00	-0.11	-0.10	1.38	3.66
	(**-7.94**)	(**-4.46**)	(1.24)	(**3.32**)	(**3.94**)	(**6.92**)		(**-7.59**)	(**-5.25**)	(-0.72)	(-0.47)	(**4.09**)	(**7.03**)

Table B7: Univariate Sorts on Firm QRP Standardized by Physical Expected Quadratic Payoff

In Panel A, at the end of month t we sort firms into quintiles based on their average standardized loss QRP (QRP^l) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B, C and D, we sort firms into quintiles based on their average standardized gain QRP (QRP^g) and standardized net QRP (QRP), respectively. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time-series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Data are from January 1996 to December 2015.

Panel A: Firm Loss QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP^l	-0.20	0.06	0.21	0.38	1.07	
$\mathbb{E}[r]$	-0.64	0.33	0.75	1.02	1.08	1.72
	(-1.48)	(0.89)	(**2.26**)	(**3.33**)	(**3.47**)	(**6.25**)
alpha	-1.29	-0.26	0.21	0.49	0.52	1.81
	(**-7.45**)	(**-2.38**)	(1.84)	(**4.50**)	(**3.84**)	(**6.63**)

Panel B: Firm Gain QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP^g	-0.37	-3.5e.3	0.10	0.20	0.36	
$\mathbb{E}[r]$	-0.36	-0.09	0.44	0.81	1.63	1.98
	(-1.21)	(-0.24)	(1.24)	(**2.35**)	(**4.70**)	(**8.32**)
alpha	-0.86	-0.68	-0.15	0.23	1.08	1.94
	(**-6.66**)	(**-6.16**)	(-1.38)	(**2.58**)	(**6.81**)	(**8.36**)

Panel C: Firm Net QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP	-0.39	-0.11	0.08	0.32	1.34	
$\mathbb{E}[r]$	0.33	0.54	0.78	0.62	0.51	0.18
	(0.87)	(1.42)	(**2.35**)	(**2.10**)	(1.71)	(0.96)
alpha	-0.28	-0.05	0.22	0.09	-0.02	0.26
	(**-2.43**)	(-0.44)	(**2.10**)	(0.71)	(-0.20)	(1.47)

Table B8: Univariate Sorts on Firm QRP Standardized by Risk-Neutral Expected Quadratic Payoff

In Panel A, at the end of month t we sort firms into quintiles based on their average standardized loss QRP (QRP^l) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B and C, we sort firms into quintiles based on their average standardized gain QRP (QRP^g) and standardized net QRP (QRP), respectively. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time-series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Data are from January 1996 to December 2015.

Panel A: Firm Loss QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP^l	-0.54	0.03	0.17	0.28	0.44	
$\mathbb{E}[r]$	-0.64	0.13	0.62	0.97	1.77	2.40
	(-1.43)	(0.36)	(1.94)	(**3.06**)	(**5.15**)	(**7.34**)
alpha	-1.29	-0.48	0.09	0.43	1.21	2.49
	(**-6.99**)	(**-4.10**)	(0.85)	(**3.52**)	(**6.26**)	(**7.32**)

Panel B: Firm Gain QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP^g	-0.14	0.01	0.12	0.24	0.67	
$\mathbb{E}[r]$	-0.63	0.18	0.55	0.99	1.32	1.95
	(-1.91)	(0.56)	(1.58)	(**2.88**)	(**3.74**)	(**7.70**)
alpha	-1.16	-0.39	-0.03	0.39	0.77	1.93
	(**-7.41**)	(**-4.01**)	(-0.26)	(**4.02**)	(**5.32**)	(**7.24**)

Panel C: Firm Net QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP	-1.02	-0.19	0.02	0.20	0.46	
$\mathbb{E}[r]$	0.32	0.53	0.79	0.62	0.51	0.19
	(0.82)	(1.38)	(**2.41**)	(**2.05**)	(1.73)	(0.88)
alpha	-0.30	-0.06	0.23	0.08	-0.01	0.29
	(**-2.50**)	(-0.56)	(**2.24**)	(0.60)	(-0.12)	(1.41)

Table B9: Univariate Sorts on Firm VRP

In Panel A, at the end of month t we sort firms into quintiles based on their average loss VRP (VRP^l) during month t, so that Quintile 1 contains the stocks with the lowest VRP^l and Quintile 5 the highest. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B and C, we sort firms into quintiles based on their average gain VRP (VRP^g) and net VRP (VRP), respectively. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time-series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. VRP is reported in monthly square percentage units. Data are from January 1996 to December 2015.

Panel A: Firm Loss VRP

	Quintiles					
	1	2	3	4	5	5-1
VRP^l	-180.65	7.17	30.97	68.41	249.24	
$\mathbb{E}[r]$	0.06	0.63	1.02	1.28	1.14	1.08
	(0.15)	(**2.31**)	(**3.02**)	(**2.76**)	(1.90)	(**2.73**)
alpha	-0.76	-0.16	0.26	0.62	0.71	1.47
	(**-3.92**)	(-1.90)	(**2.75**)	(**3.59**)	(**2.71**)	(**3.71**)

Panel B: Firm Gain VRP

	Quintiles					
	1	2	3	4	5	5-1
VRP^g	-62.18	-7.18	8.29	31.34	197.72	
$\mathbb{E}[r]$	0.17	0.60	1.03	1.00	0.64	0.48
	(0.44)	(**2.13**)	(**3.33**)	(**2.42**)	(1.02)	(1.35)
alpha	-0.38	-0.25	0.24	0.27	0.18	0.56
	(**-2.79**)	(**-2.45**)	(**2.99**)	(1.87)	(0.84)	(**2.20**)

Panel C: Firm Net VRP

	Quintiles					
	1	2	3	4	5	5-1
VRP	-327.88	-16.27	20.19	62.65	268.45	
$\mathbb{E}[r]$	0.21	0.68	0.76	1.01	0.94	0.73
	(0.43)	(**2.12**)	(**2.61**)	(**2.59**)	(1.77)	(**2.46**)
alpha	-0.42	-0.06	-0.02	0.26	0.42	0.84
	(**-2.25**)	(-0.52)	(-0.19)	(1.72)	(1.94)	(**2.51**)

Table B10: Univariate Sorts on Firm QRP: Dividend and Non-Dividend Stocks

In Panel A and C, at the end of month t we sort firms into quintiles based on their average loss QRP (QRP^l) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B and D, we sort firms into quintiles based on their average gain QRP (QRP^g). We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time-series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. Panel A and B are univariate sorts using the subsample of firms that do not pay any dividends. Panel C and D are univariate sorts using the subsample of firms that pay dividends. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. QRP is reported in monthly square percentage units. Data are from January 1996 to December 2015.

Non-Dividend Paying Stocks

	Panel A: Firm Loss QRP							Panel B: Firm Gain QRP					
	Quintiles							Quintiles					
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
QRP^l	-268.96	-2.39	43.41	96.06	334.30		QRP^g	-98.83	-9.30	19.12	53.68	194.13	
$\mathbb{E}[r]$	-2.41	-0.01	0.75	1.48	1.41	3.82		-2.02	-0.24	0.45	0.65	1.73	3.75
	(-**3.17**)	(-0.02)	(1.51)	(**2.71**)	(**2.06**)	(**6.53**)		(-**2.99**)	(-0.52)	(0.94)	(1.23)	(**2.20**)	(**5.45**)
alpha	-3.23	-0.70	0.13	0.74	0.54	3.77		-2.80	-0.86	-0.21	-0.04	0.82	3.62
	(-**7.74**)	(-**1.97**)	(0.47)	(2.49)	(1.43)	(**6.06**)		(-**6.29**)	(-**3.51**)	(-0.97)	(-0.16)	(**1.98**)	(**5.22**)

Dividend Paying Stocks

	Panel C: Firm Loss QRP							Panel D: Firm Gain QRP					
	Quintiles							Quintiles					
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
QRP^l	-109.16	9.79	31.34	61.70	196.90		QRP^g	-47.30	-1.51	13.37	35.39	152.32	
$\mathbb{E}[r]$	-0.71	0.34	0.93	1.35	2.11	2.82		-0.76	0.20	0.84	0.85	1.93	2.69
	(-1.65)	(1.20)	(**2.92**)	(**3.21**)	(**3.77**)	(**6.45**)		(-1.94)	(0.64)	(**2.83**)	(**2.18**)	(**3.85**)	(**7.66**)
alpha	-1.30	-0.13	0.38	0.66	1.22	2.52		-1.35	-0.30	0.31	0.20	1.14	2.50
	(-**6.57**)	(-1.34)	(**3.63**)	(**3.87**)	(**4.19**)	(**5.93**)		(-**7.61**)	(-**2.82**)	(**3.23**)	(1.69)	(**4.63**)	(**7.07**)

Table B11: Univariate Sorts on Firm Loss QRP: Small, Medium and Large Firms

In Panel A, at the end of month t we sort small firms into quintiles based on their average loss QRP (QRP^l) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. Small firms are in the bottom 30% based on market capitalization. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B, and C, we sort medium and large firms into quintiles based on their average loss QRP (QRP^l). Medium and large firms are in the middle 40%, and top 30% based on market capitalization. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. QRP is reported in monthly square percentage units. Data are from January 1996 to December 2015.

	Panel A: Small Firms						Panel B: Medium Firms					
	Quintiles						Quintiles					
	1	2	3	4	5	5-1	1	2	3	4	5	5-1
QRP^l	-257.90	8.35	59.72	119.34	391.40		-120.34	9.13	35.92	66.89	175.99	
$\mathbb{E}[r]$	-2.72	0.36	1.10	1.91	2.36	5.08	-1.38	0.34	0.95	1.35	2.16	3.54
	(**-4.06**)	(0.69)	(**2.22**)	(**3.65**)	(**3.57**)	(**10.11**)	(**-2.45**)	(0.86)	(**2.39**)	(**3.25**)	(**3.98**)	(**8.13**)
alpha	-3.74	-0.57	0.21	0.98	1.31	5.05	-2.19	-0.37	0.22	0.58	1.23	3.42
	(**-11.70**)	(**-2.87**)	(0.89)	(**3.97**)	(**3.79**)	(**9.70**)	(**-8.05**)	(**-2.26**)	(1.33)	(**3.46**)	(**4.33**)	(**7.25**)

	Panel C: Large Firms					
	Quintiles					
	1	2	3	4	5	5-1
QRP^l	-61.18	8.43	21.14	37.58	98.38	
$\mathbb{E}[r]$	-0.44	0.42	0.54	1.05	1.42	1.86
	(-1.11)	(1.47)	(**1.98**)	(**2.96**)	(**2.97**)	(**5.81**)
alpha	-0.95	-0.03	0.10	0.46	0.67	1.62
	(**-5.53**)	(-0.25)	(0.94)	(**3.72**)	(**3.29**)	(**5.00**)

Table B12: Univariate Sorts on Firm Gain QRP: Small, Medium and Large Firms

In Panel A, at the end of month t we sort small firms into quintiles based on their average gain QRP (QRP^g) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. Small firms are in the bottom 30% based on market capitalization. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B, and C, we sort medium and large firms into quintiles based on their average gain QRP (QRP^g). Medium and large firms are in the middle 40%, and top 30% based on market capitalization. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. QRP is reported in monthly square percentage units. Data are from January 1996 to December 2015.

Panel A: Small Firms

	Quintiles					
	1	2	3	4	5	5-1
QRP^g	-111.39	-15.42	18.40	59.87	240.70	
$\mathbb{E}[r]$	-2.18	-0.26	0.39	1.34	3.32	5.50
	(**-3.77**)	(-0.55)	(0.80)	(**2.35**)	(**4.39**)	(**10.68**)
alpha	-3.08	-1.13	-0.52	0.37	2.18	5.26
	(**-11.65**)	(**-6.85**)	(**-2.88**)	(1.46)	(**4.88**)	(**9.90**)

Panel B: Medium Firms

	Quintiles					
	1	2	3	4	5	5-1
QRP^g	-43.44	-2.56	15.31	40.22	151.51	
$\mathbb{E}[r]$	-0.95	0.21	0.72	0.99	2.42	3.37
	(**-2.04**)	(0.54)	(1.79)	(**2.29**)	(**3.90**)	(**7.89**)
alpha	-1.72	-0.49	-0.01	0.18	1.49	3.22
	(**-8.44**)	(**-3.55**)	(-0.08)	(1.07)	(**4.83**)	(**7.65**)

Panel C: Large Firms

	Quintiles					
	1	2	3	4	5	5-1
QRP^g	-18.36	2.05	11.35	24.68	87.24	
$\mathbb{E}[r]$	-0.38	0.38	0.73	0.88	1.30	1.69
	(-1.10)	(1.31)	(**2.45**)	(**2.55**)	(**2.86**)	(**5.58**)
alpha	-0.89	-0.09	0.25	0.30	0.61	1.50
	(**-5.72**)	(-0.97)	(**2.04**)	(**2.59**)	(**3.23**)	(**4.82**)

Table B13: Conditional Triple Sorts on Book-to-Market and QRP

In each panel, stocks are sorted every month in terciles based on their book-to-market. Next, in Panel A (B) stocks within each tercile of earnings yield are further sorted in terciles based on their gain (loss) QRP. Finally, within each tercile of loss (gain) QRP stocks are sorted in terciles based on their loss (gain) QRP. We report Jensen alphas with respect to the Fama-French five-factor model (Fama and French; 2015) for all tercile portfolios as well as for the difference between the top and bottom tercile (H–L). t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. The sample period is from January 1996 to December 2015.

Panel A: Conditional Triple Sorts on Book-to-Market, Gain and Loss QRP

		Book-to-Market								
		L			M			H		
		Gain QRP			Gain QRP			Gain QRP		
		L	M	H	L	M	H	L	M	H
Loss QRP	L	-3.53	-2.93	-3.21	-1.15	-0.97	-0.78	-1.19	-0.86	-0.45
	M	-1.32	-1.19	-0.10	-0.15	-0.19	0.02	0.74	0.72	1.15
	H	-1.80	-0.75	-0.85	0.26	-0.48	0.80	2.90	2.29	2.74
	H–L	1.73	2.18	2.32	1.42	0.49	1.58	4.09	3.14	3.16
		(**3.24**)	(**5.12**)	(**2.84**)	(**3.29**)	(1.42)	(**2.63**)	(**7.48**)	(**6.57**)	(**4.41**)

Panel B: Conditional Triple Sorts on Book-to-Market, Loss and Gain QRP

		Book-to-Market								
		L			M			H		
		Loss QRP			Loss QRP			Loss QRP		
		L	M	H	L	M	H	L	M	H
Gain QRP	L	-1.36	-1.39	-0.60	-0.90	-0.55	-0.29	-3.65	-2.91	-3.53
	M	0.17	-0.28	1.24	-0.20	-0.23	0.11	-1.63	-1.67	-0.83
	H	3.49	2.32	2.52	0.40	0.37	1.08	-1.71	-1.00	-0.44
	H–L	4.85	3.70	3.08	1.30	0.92	1.37	1.94	1.91	3.06
		(**6.49**)	(**5.51**)	(**3.98**)	(**3.34**)	(**2.45**)	(**3.27**)	(**4.07**)	(**4.81**)	(**4.38**)

Table B14: Univariate Sorts on Loss and Gain QRP Different Trading Strategies

In this table we use different L/M/N portfolio formation strategies following Jegadeesh and Titman (1993), where we have an estimation period of L months, a waiting period of M months, and a holding period of N months. In Panel A and B, at the end of month $t-1$ we sort firms into quintiles based on their average loss or gain QRP (QRP^l or QRP^g) during month $t-1$, so that Quintile 1 contains the stocks with the lowest QRP^l (QRP^g) and Quintile 5 the highest. Similarly, in Panel C and D, we sort firms based on their average loss or gain QRP (QRP^l or QRP^g) during month $t-3$. We then form value-weighted portfolios of these firms, holding the ranking constant for month $t+1$. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. QRP is reported in monthly square percentage units. The sample period is from January 1996 to December 2015.

1/1/1 Trading Strategy

	Panel A: Firm Loss QRP							Panel B: Firm Gain QRP					
	Quintiles							Quintiles					
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
QRP^l	-143.52	8.53	32.87	66.88	219.27			-56.96	-2.59	14.03	38.21	158.93	
$\mathbb{E}[r]$	-0.84	0.04	0.48	0.64	0.95	1.79		-1.16	-0.11	0.32	0.64	1.09	2.25
	(**-2.04**)	(0.15)	(1.43)	(1.55)	(1.69)	(**4.86**)		(-2.82)	(-0.38)	(1.05)	(1.72)	(2.04)	(**6.58**)
alpha	-0.93	0.05	0.47	0.65	0.98	1.91		-1.20	-0.13	0.33	0.66	1.06	2.26
	(**-2.33**)	(0.17)	(1.39)	(1.52)	(1.77)	(**5.19**)		(–2.96)	(-0.47)	(1.03)	(1.75)	(**1.99**)	(**6.30**)

1/3/1 Trading Strategy

	Panel C: Firm Loss QRP							Panel D: Firm Gain QRP					
	Quintiles							Quintiles					
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
QRP^l	-139.54	8.45	32.78	66.62	217.98		QRP^g	-56.88	-2.63	13.96	37.99	155.03	
$\mathbb{E}[r]$	-0.87	0.09	0.50	0.62	0.89	1.75		-0.79	0.01	0.46	0.24	0.68	1.47
	(**-2.05**)	(0.31)	(1.60)	(1.44)	(1.48)	(**5.21**)		(-1.70)	(0.03)	(1.61)	(0.61)	(1.26)	(**4.33**)
alpha	-0.83	0.10	0.53	0.72	0.99	1.82		-0.74	0.04	0.49	0.27	0.77	1.52
	(**-2.02**)	(0.37)	(1.77)	(1.84)	(1.74)	(**5.58**)		(-1.70)	(0.15)	(1.81)	(0.71)	(1.44)	(**4.16**)

Table B15: Univariate Sorts on Firm QRP Without Microcaps

In Panel A, at the end of month t we sort firms with beginning of month t stock price higher than 5 USD into quintiles based on their average loss QRP (QRP^l) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B and C, we sort firms into quintiles based on their average gain QRP (QRP^g) and net QRP (QRP), respectively. We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time-series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. QRP is reported in monthly square percentage units. Data are from January 1996 to December 2015.

Panel A: Firm Loss QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP^l	-144.53	8.47	32.81	66.84	219.96	
$\mathbb{E}[r]$	-1.36	-0.11	0.58	0.95	1.65	3.01
	(**-2.99**)	(-0.38)	(1.78)	(**2.23**)	(**3.11**)	(**7.64**)
alpha	-1.97	-0.59	0.03	0.25	0.77	2.74
	(**-8.94**)	(**-4.98**)	(0.30)	(1.60)	(**3.04**)	(**6.70**)

Panel B: Firm Gain QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP^g	-57.00	-2.54	14.09	38.33	161.36	
$\mathbb{E}[r]$	-1.36	-0.22	0.44	0.50	1.53	2.89
	(**-3.23**)	(-0.73)	(1.46)	(1.28)	(**2.97**)	(**8.55**)
alpha	-1.96	-0.73	-0.09	-0.15	0.75	2.72
	(**-10.34**)	(**-6.35**)	(-0.92)	(-1.26)	(**3.43**)	(**7.99**)

Panel C: Firm Net QRP

	Quintiles					
	1	2	3	4	5	5-1
QRP	-237.86	-21.61	13.90	51.35	223.56	
$\mathbb{E}[r]$	-0.31	0.17	0.19	0.32	0.26	0.57
	(-0.61)	(0.53)	(0.65)	(0.89)	(0.57)	(1.77)
alpha	-1.01	-0.35	-0.29	-0.30	-0.54	0.47
	(**-4.95**)	(**-2.84**)	(**-4.20**)	(**-2.13**)	(**-2.73**)	(1.39)

Table B16: Fama-MacBeth Regressions Controlling for Systematic Risk: 1 Month Waiting Period

This table reports the time-series average of the monthly estimated coefficients for different factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In each regression from III to VII we include the firm loss and gain quadratic risk premium with different factor models: CAPM, market skewness factor model (Chang, Christoffersen and Jacobs; 2013), market quadratic risk premium model (Bollerslev, Tauchen and Zhou; 2009), Carhart four-factor model, and the GDA five-factor model (Farago and Tédongap; 2018), respectively. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. In the first step, we regress six months of daily excess returns of the 5150 firms on the different factor models to obtain their respective betas. In the second step, we run cross-sectional regressions of month $t+1$ firm excess returns against month $t-1$ estimated betas and firm quadratic risk premium. T-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

I		II		III		IV		V		VI		VII	
Cst	1.4e-3	Cst	-2.4e-3	Cst	1.8e-3	Cst	1.7e-3	Cst	1.8e-3	Cst	1.4e-3	Cst	2.4e-3
	(0.30)		(-0.60)		(0.61)		(0.59)		(0.63)		(0.56)		(0.88)
QRP	0.03	QRP^l	0.34	QRP^l	0.34	QRP^l	0.34	QRP^l	0.35	QRP^l	0.35	QRP^l	0.35
	(0.88)		(**9.19**)		(**9.92**)		(**9.89**)		(**10.64**)		(**9.68**)		(**10.33**)
		QRP^g	0.59	QRP^g	0.63	QRP^g	0.64	QRP^g	0.64	QRP^g	0.63	QRP^g	0.65
			(**8.29**)		(**9.87**)		(**9.98**)		(**9.97**)		(**9.93**)		(**10.05**)
				$\beta_{m,CAPM}$	-2.5e-3	$\beta_{m,SKEW}$	-2.5e-3	$\beta_{m,BTZ}$	-2.4e-3	$\beta_{m,CH}$	-1.9e-3	$\beta_{m,W}$	-2.9e-3
					(-0.82)		(-0.86)		(-0.82)		(-0.86)		(-0.98)
						β_{MSKEW}	0.06	β_{MQRP^l}	-2.7e-6	β_{smb}	-2.1e-3	β_X	7.2e-6
							(0.95)		(-0.44)		(-1.88)		(1.32)
								β_{MQRP^g}	1.1e-6	β_{hml}	-1.6e-5	$\beta_{\boldsymbol{D}}$	0.13
									(0.41)		(-0.01)		(1.26)
								β_{VIX}	1.5e-7	β_{mom}	-1.0e-3	$\beta_{W\boldsymbol{D}}$	-2.9e-3
									(0.02)		(-0.40)		(-1.36)
												$\beta_{X\boldsymbol{D}}$	6.8e-3
													(1.70)
Adj. R^2	1.19		1.59		4.99		5.41		6.22		8.78		6.53

Table B17: Fama-MacBeth Regressions Controlling for Other Firm Characteristics: 1 Month Waiting Period

This table reports the time-series average of the monthly estimated coefficients for factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In regression VIII we include the firm loss and gain quadratic risk premium with the relative signed jump variation (RSJ) from Bollerslev, Li and Zhao (forthcoming). In regression IX we include the firm loss and gain quadratic risk premium with all the firm characteristics: RSJ, idiosyncratic volatility ($IVOL$) computed as in Ang, Hodrick, Xing and Zhang (2006), past 1-month cumulative excess return (P01M), past 12-month cumulative excess return (P12M), size, book-to-market (B/M), illiquidity ($ILLIQ$), risk-neutral skewness ($FSKEW$), the loss and gain realized semi-variances (RV^l and RV^g), and firm risk neutral skewness. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. We run cross-sectional regressions of month $t+1$ firm excess returns against month $t-1$ firm characteristics and firm quadratic risk premium. T-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

I		II		VIII		IX	
Cst	1.4e-3	Cst	-2.4e-3	Cst	-2.9e-3	Cst	-0.02
	(0.30)		(-0.60)		(-0.72)		(-1.18)
QRP	0.03	QRP^l	0.34	QRP^l	0.34	QRP^l	0.52
	(0.88)		(**9.19**)		(**9.23**)		(**12.00**)
		QRP^g	0.59	QRP^g	0.60	QRP^g	0.79
			(**8.29**)		(**8.30**)		(**10.26**)
				RSJ	-2.6e-3	RSJ	2.4e-3
					(-1.02)		(1.09)
						$IVOL$	-0.24
							(-**2.20**)
						P01M	-0.03
							(-**2.70**)
						P12M	1.6e-3
							(0.79)
						Size	8.3e-4
							(1.31)
						B/M	0.01
							(1.64)
						ILLIQ	-0.21
							(-0.85)
						RV^l	0.15
							(**3.22**)
						RV^g	-0.12
							(-1.05)
						$FSKEW$	0.01
							(**5.55**)
Adj. R^2	1.19	Adj. R^2	1.59	Adj. R^2	2.33	Adj. R^2	9.15

Table B18: Fama-MacBeth Regressions Controlling for Systematic Risk: 3 Month Waiting Period

This table reports the time-series average of the monthly estimated coefficients for different factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In each regression from III to VII we include the firm loss and gain quadratic risk premium with different factor models: CAPM, market skewness factor model (Chang, Christoffersen and Jacobs; 2013), market quadratic risk premium model (Bollerslev, Tauchen and Zhou; 2009), Carhart four-factor model, and the GDA five-factor model (Farago and Tédongap; 2018), respectively. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. In the first step, we regress six months of daily excess returns of the 5150 firms on the different factor models to obtain their respective betas. In the second step, we run cross-sectional regressions of month $t+1$ firm excess returns against month $t-3$ estimated betas and firm quadratic risk premium. T-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

	I		II		III		IV		V		VI		VII
Cst	5.2e-4	Cst	-1.3e-3	Cst	1.9e-3	Cst	2.1e-3	Cst	2.3e-3	Cst	1.9e-3	Cst	2.1e-3
	(0.11)		(-0.32)		(0.67)		(0.74)		(0.85)		(0.66)		(0.77)
QRP	0.08	QRP^l	0.21	QRP^l	0.22	QRP^l	0.23	QRP^l	0.22	QRP^l	0.24	QRP^l	0.23
	(**2.14**)		(**4.96**)		(**5.57**)		(**5.78**)		(**5.55**)		(**6.27**)		(**5.82**)
		QRP^g	0.39	QRP^g	0.40	QRP^g	0.40	QRP^g	0.39	QRP^g	0.42	QRP^g	0.38
			(**4.75**)		(**5.57**)		(**5.63**)		(**5.49**)		(**6.15**)		(**5.46**)
				$\beta_{m,CAPM}$	-1.7e-3	$\beta_{m,SKEW}$	-1.7e-3	$\beta_{m,BTZ}$	-2.1e-3	$\beta_{m,CH}$	-1.2e-3	$\beta_{m,W}$	-2.1e-3
					(-0.54)		(-0.55)		(-0.71)		(-0.45)		(-0.67)
						β_{MSKEW}	2.3e-3	β_{MQRP^l}	-1.3e-7	β_{smb}	-1.7e-3	β_X	3.6e-6
							(0.03)		(-0.02)		(-1.55)		(0.49)
								β_{MQRP^g}	2.6e-6	β_{hml}	-8.5e-5	$\beta_{\boldsymbol{D}}$	0.10
									(1.15)		(-0.06)		(0.98)
								β_{VIX}	-2.6e-6	β_{mom}	-7.7e-5	$\beta_{W\boldsymbol{D}}$	-1.9e-3
									(-0.21)		(-0.04)		(-0.77)
												$\beta_{X\boldsymbol{D}}$	3.0e-6
													(0.49)
Adj. R^2	1.05		1.40		4.62		5.02		5.69		7.99		5.77

Table B19: Fama-MacBeth Regressions Controlling for Other Firm Characteristics: 3 Month Waiting Period

This table reports the time-series average of the monthly estimated coefficients for factor models including firm quadratic risk premium (QRP^l, QRP^g and QRP). In regression VIII we include the firm loss and gain quadratic risk premium with the relative signed jump variation (RSJ) from Bollerslev, Li and Zhao (forthcoming). In regression IX we include the firm loss and gain quadratic risk premium with all the firm characteristics: RSJ, idiosyncratic volatility ($IVOL$) computed as in Ang, Hodrick, Xing and Zhang (2006), past 1-month cumulative excess return (P01M), past 12-month cumulative excess return (P12M), size, book-to-market (B/M), illiquidity ($ILLIQ$), risk-neutral skewness ($FSKEW$), the loss and gain realized semi-variances (RV^l and RV^g), and firm risk neutral skewness. All coefficients are estimated using the Fama and MacBeth (1973) two-step regression applied on 5150 individual firms. We run cross-sectional regressions of month $t+1$ firm excess returns against month $t-3$ firm characteristics and firm quadratic risk premium. T-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Adjusted R^2 is reported in percentage. Data are from January 1996 to December 2015.

I		II		VIII		IX	
Cst	5.2e-4	Cst	-1.3e-3	Cst	-1.6e-3	Cst	2.3e-3
	(0.11)		(-0.32)		(-0.38)		(0.15)
QRP	0.08	QRP^l	0.21	QRP^l	0.21	QRP^l	0.36
	(**2.14**)		(**4.96**)		(**4.98**)		(**7.17**)
		QRP^g	0.39	QRP^g	0.38	QRP^g	0.57
			(**4.75**)		(**4.70**)		(**6.37**)
				RSJ	2.1e-3	RSJ	6.0e-4
					(0.92)		(0.30)
						$IVOL$	-0.11
							(-0.95)
						P01M	-0.01
							(-1.86)
						P12m	-7.1e-4
							(-0.46)
						Size	-7.0e-5
							(-0.11)
						B/M	2.4e-3
							(0.70)
						ILLIQ	0.12
							(0.57)
						RV^l	-0.07
							(-1.19)
						RV^g	-0.05
							(-0.53)
						$FSKEW$	2.7e-3
							(**2.51**)
Adj. R^2	1.05	Adj. R^2	1.40	Adj. R^2	2.04	Adj. R^2	8.13

Table B20: Conditional Double Sorts on Exposures to GDA Factors and Loss QRP

In each of the five panels of the table, stocks are first sorted every month in quintiles based on their multivariate exposure to one of the five GDA factors. As referred to by Farago and Tédongap (2018), these factors are the market factor (Panel A), the market downside factor (Panel B), the downstate factor (Panel C), the volatility factor (Panel D) and the volatility downside factor (Panel E). Next, stocks within each quintile of the given GDA factor exposure are further sorted in quintiles based on their loss quadratic risk premium (QRP^l). The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintiles. We also report the difference in average excess returns between the top and the bottom quintile (5-1). T-statistics based on standard errors computed using the Newey and West (1987) procedure are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Data are from January 1996 to December 2015.

Panel A: Market Factor

Loss QRP	Market Factor 1	2	3	4	5	5-1	
1	-0.73	-0.63	-0.48	-1.25	-1.93	-1.21	-(1.70)
2	0.19	0.45	0.40	0.39	-0.05	-0.25	(-0.48)
3	0.77	0.76	0.79	0.77	0.29	-0.48	(-0.80)
4	1.32	1.14	1.41	1.39	1.53	0.21	(0.36)
5	1.72	1.43	2.00	2.23	2.47	0.75	(1.14)
5-1	2.45	2.06	2.49	3.48	4.40		
	(4.80)	**(5.07)**	**(5.05)**	**(7.11)**	**(7.12)**		

Panel B: Market Downside Factor

Loss QRP	Market Downside Factor 1	2	3	4	5	5-1	
1	-1.58	-0.66	-0.67	-0.94	-1.87	-0.29	(-0.52)
2	0.17	0.62	0.48	0.20	0.34	0.18	(0.51)
3	1.35	0.64	1.03	0.96	0.92	-0.43	(-1.35)
4	1.79	1.24	1.23	0.97	0.93	-0.87	(-1.70)
5	2.50	2.35	2.04	1.20	1.85	-0.65	(-1.26)
5-1	4.08	3.01	2.71	2.14	3.72		
	(6.32)	**(5.41)**	**(7.02)**	**(4.62)**	**(6.16)**		

Panel C: Downstate Factor

Loss QRP	Downstate Factor 1	2	3	4	5	5-1	
1	-1.74	-0.84	-0.60	-0.81	-1.87	-0.13	(-0.26)
2	-0.11	0.62	0.45	0.25	0.37	0.48	(1.53)
3	1.39	1.08	0.73	0.84	1.03	-0.36	(-0.97)
4	1.65	1.52	1.13	0.78	1.30	-0.34	(-0.67)
5	2.11	2.37	2.27	1.85	1.79	-0.32	(-0.66)
5-1	3.85	3.21	2.86	2.65	3.66		
	(6.46)	**(6.22)**	**(5.96)**	**(5.26)**	**(6.97)**		

Panel D: Volatility Factor

Loss QRP	Volatility Factor 1	2	3	4	5	5-1	
1	-1.61	-0.74	-0.54	-0.44	-1.30	0.30	(0.55)
2	-0.26	0.45	0.43	0.17	0.26	0.52	(1.25)
3	0.94	0.92	0.92	0.73	0.80	-0.15	(-0.41)
4	1.57	1.22	0.99	1.51	1.35	-0.22	(-0.51)
5	2.80	2.16	1.63	1.96	2.23	-0.57	(-1.10)
5-1	4.41	2.90	2.17	2.40	3.54		
	(6.96)	**(5.67)**	**(5.00)**	**(5.53)**	**(6.52)**		

Panel E: Volatility Downside Factor

Loss QRP	Volatility Downside Factor 1	2	3	4	5	5-1	
1	-1.28	-0.40	-0.78	-0.99	-1.95	-0.67	(-1.47)
2	0.12	0.59	0.66	0.18	0.02	-0.10	(-0.28)
3	1.19	0.93	0.88	0.95	0.88	-0.30	(-0.91)
4	1.99	1.09	1.13	1.30	0.87	-1.12	**(-2.51)**
5	2.00	2.64	1.43	2.15	1.84	-0.16	(-0.28)
5-1	3.28	3.04	2.21	3.14	3.80		
	(5.75)	**(5.45)**	**(4.82)**	**(5.90)**	**(6.35)**		

Table B21: Conditional Double Sorts on Exposures to GDA Factors and Gain QRP

In each of the five panels of the table, stocks are first sorted every month in quintiles based on their multivariate exposure to one of the five GDA factors. As referred to by Farago and Tédongap (2018), these factors are the market factor (Panel A), the market downside factor (Panel B), the downstate factor (Panel C), the volatility factor (Panel D) and the volatility downside factor (Panel E). Next, stocks within each quintile of the given GDA factor exposure are further sorted in quintiles based on their gain quadratic risk premium. The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintiles. We also report the difference in average excess returns between the top and the bottom quintile (5-1). T-statistics based on standard errors computed using the Newey and West (1987) procedure are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Data are from January 1996 to December 2015.

Panel A: Market Factor

Gain QRP	Market Factor 1	2	3	4	5	5-1	
1	-0.92	-0.38	-0.63	-1.00	-1.64	-0.72	(-1.12)
2	-0.18	0.15	0.04	-0.07	0.05	0.23	(0.43)
3	0.54	0.43	0.72	0.89	-0.03	-0.57	(-0.98)
4	0.86	0.66	1.03	1.01	0.92	0.06	(0.11)
5	1.65	1.82	2.09	2.13	2.09	0.44	(0.65)
5-1	2.57	2.20	2.73	3.13	3.73		
	(5.36)	**(5.26)**	**(7.95)**	**(7.15)**	**(5.92)**		

Panel B: Market Downside Factor

Gain QRP	Market Downside Factor 1	2	3	4	5	5-1	
1	-1.21	-0.63	-0.87	-1.22	-1.95	-0.74	(-1.83)
2	0.30	0.30	0.28	0.34	0.05	-0.26	(-0.66)
3	0.54	0.81	0.96	0.74	0.39	-0.15	(-0.41)
4	1.26	0.87	0.98	0.71	0.60	-0.66	(-1.72)
5	2.35	1.71	2.07	1.74	2.59	0.23	(0.45)
5-1	3.56	2.34	2.94	2.95	4.54		
	(5.71)	**(5.35)**	**(7.41)**	**(5.45)**	**(8.81)**		

Panel C: Downstate Factor

Gain QRP	Downstate Factor 1	2	3	4	5	5-1	
1	-1.26	-0.61	-0.92	-1.06	-1.64	-0.38	(-1.02)
2	0.24	0.25	-0.05	0.11	-0.05	-0.29	(-0.85)
3	0.61	0.81	1.00	0.86	0.48	-0.12	(-0.37)
4	0.95	1.08	0.71	0.68	0.88	-0.07	(-0.17)
5	2.24	2.01	1.81	1.39	2.45	0.21	(0.43)
5-1	3.51	2.61	2.73	2.45	4.10		
	(5.80)	**(5.39)**	**(6.31)**	**(5.67)**	**(8.50)**		

Panel D: Volatility Factor

Gain QRP	Volatility Factor 1	2	3	4	5	5-1	
1	-1.60	-0.83	-0.75	-0.61	-1.19	0.40	(0.81)
2	-0.04	0.05	0.27	0.24	-0.13	-0.09	(-0.22)
3	0.94	0.84	0.55	0.80	0.45	-0.49	(-1.12)
4	0.72	0.75	0.89	1.08	0.91	0.18	(0.38)
5	2.25	2.02	1.69	1.52	2.59	0.35	(0.63)
5-1	3.84	2.85	2.44	2.13	3.79		
	(6.91)	**(5.79)**	**(5.42)**	**(5.55)**	**(6.83)**		

Panel E: Volatility Downside Factor

Gain QRP	Volatility Downside Factor 1	2	3	4	5	5-1	
1	-1.15	-0.78	-0.80	-0.72	-1.96	-0.81	(-2.19)
2	0.23	0.30	0.39	0.14	0.08	-0.15	(-0.46)
3	0.58	0.81	0.66	0.83	0.47	-0.12	(-0.31)
4	1.47	1.21	1.11	0.73	0.61	-0.85	(-1.69)
5	2.26	2.14	1.16	1.55	2.37	0.10	(0.20)
5-1	3.41	2.93	1.96	2.27	4.32		
	(5.74)	**(6.39)**	**(4.82)**	**(4.82)**	**(9.02)**		

Table B22: Conditional Double Sorts on Exposures to Other Market Factors and QRP

Stocks are sorted every month in quintiles based on their exposure to market loss (gain) quadratic risk premium in Panel A (C), and their exposure to market risk neutral skewness in Panel B and D. Then, stocks within each quintile of exposure to these factors are further sorted in quintiles based on their firm loss QRP in Panel A and B, and their firm gain QRP on Panel C and D. Firm exposures to market loss and gain QRP are estimated following the three-factor model implied by the general equilibrium setting of Bollerslev, Tauchen and Zhou (2009), i.e, with market excess returns, conditional market variance, and volatility of volatility, and where we replace volatility of volatility by the market loss and gain QRP. Firm exposures to market risk-neutral skewness are estimated following the model of Chang, Christoffersen and Jacobs (2013). The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintile. We also report the difference in average excess returns between the top and the bottom quintile (5-1). T-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Data are from January 1996 to December 2015.

Panel A: Market Loss QRP

		Market Loss QRP						
		1	2	3	4	5	5-1	
Firm Loss QRP	1	-1.65	-0.54	-0.63	-1.04	-2.03	-0.38	(-0.81)
	2	0.05	0.36	0.56	0.24	0.27	0.21	(0.64)
	3	0.73	1.00	0.79	0.87	0.95	0.22	(0.51)
	4	1.37	1.13	1.39	1.01	1.64	0.26	(0.52)
	5	1.63	2.24	2.23	1.58	2.57	0.95	(1.93)
	5-1	3.27	2.79	2.87	2.62	4.60		
		(**5.82**)	(**5.56**)	(**6.00**)	(**5.34**)	(**7.88**)		

Panel B: Market Risk Neutral Skewness

		Market Risk Neutral Skewness						
		1	2	3	4	5	5-1	
Firm Loss QRP	1	-1.29	-0.61	-0.72	-0.70	-2.02	-0.73	(-1.34)
	2	0.21	0.34	0.39	0.32	0.44	0.23	(0.67)
	3	1.12	1.11	0.56	0.77	1.11	-0.01	(-0.02)
	4	1.19	1.23	1.20	1.34	1.56	0.37	(0.83)
	5	2.18	1.76	1.40	2.38	2.58	0.40	(0.67)
	5-1	3.47	2.37	2.12	3.07	4.60		
		(**5.90**)	(**5.10**)	(**4.66**)	(**6.33**)	(**7.09**)		

Panel C: Market Gain QRP

		Market Gain QRP						
		1	2	3	4	5	5-1	
Firm Gain QRP	1	-1.53	-0.94	-0.15	-0.74	-1.82	-0.28	(-0.64)
	2	-0.09	0.24	0.11	0.10	0.15	0.24	(0.64)
	3	0.39	0.77	0.76	0.79	0.56	0.17	(0.46)
	4	0.81	0.96	1.06	0.44	1.18	0.37	(0.86)
	5	1.73	1.75	1.81	1.85	2.18	0.46	(0.89)
	5-1	3.26	2.68	1.96	2.59	4.00		
		(**6.31**)	(**8.05**)	(**4.98**)	(**5.27**)	(**7.24**)		

Panel D: Market Risk Neutral Skewness

		Market Risk Neutral Skewness						
		1	2	3	4	5	5-1	
Firm Gain QRP	1	-1.78	-0.66	-0.56	-0.71	-1.83	-0.05	(-0.13)
	2	0.07	0.39	0.08	0.30	0.24	0.16	(0.48)
	3	0.98	0.87	0.56	0.66	0.88	-0.09	(-0.26)
	4	1.00	0.64	0.76	0.97	1.19	0.19	(0.41)
	5	2.24	1.46	1.78	2.06	2.62	0.38	(0.56)
	5-1	4.02	2.12	2.34	2.77	4.45		
		(**5.91**)	(**4.69**)	(**5.38**)	(**6.77**)	(**8.15**)		

Table B23: Conditional Double Sorts on Other Firm Characteristics: Loss QRP

In each of the four panels of the table, stock are sorted into quintiles each month based on four different firm characteristics: option illiquidity, idiosyncratic volatility, risk neutral skewness, and relative signed jump variation, respectively. Then, stocks within each quintile are further sorted in quintiles based on their loss quadratic risk premium. Option illiquidity is measured as in Goyenko, Ornthanalai and Tang (2015). Idiosyncratic volatility is estimated following Ang, Hodrick, Xing and Zhang (2006). Risk neutral skewness is estimated following Bakshi, Kapadia and Madan (2003). Relative signed jump variation is estimated following Bollerslev, Li and Zhao (forthcoming). t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. The sample period is from January 1996 to December 2015.

Panel A: Option Illiquidity

Loss QRP	Option Illiquidity 1	2	3	4	5	5-1	
1	-1.48	-1.02	-1.34	-1.39	-1.17	0.31	(1.01)
2	0.25	-0.25	-0.16	-0.12	0.08	-0.16	(-0.98)
3	0.58	0.74	0.39	0.73	0.81	0.23	(1.65)
4	0.97	0.84	0.81	1.16	0.95	-0.02	(-0.07)
5	1.85	1.18	1.76	1.88	1.88	0.03	(0.10)
5-1	3.33	2.20	3.10	3.27	3.04		
	(**5.74**)	(**3.98**)	(**4.51**)	(**4.46**)	(**4.79**)		

Panel B: Idiosyncratic Volatility

Loss QRP	Idiosyncratic Volatility 1	2	3	4	5	5-1	
1	-0.18	-1.20	-1.67	-2.33	-3.71	-3.53	(**-4.02**)
2	0.13	-0.04	-0.25	-0.67	-0.72	-0.86	(-1.51)
3	0.22	0.19	0.49	0.72	0.36	0.14	(0.29)
4	0.67	0.88	0.72	1.07	1.26	0.59	(1.47)
5	0.77	1.48	1.56	1.54	1.87	1.11	(1.58)
5-1	0.94	2.68	3.23	3.87	5.58		
	(**3.53**)	(**6.26**)	(**4.81**)	(**5.17**)	(**4.39**)		

Panel C: Risk Neutral Skewness

Loss QRP	Risk Neutral Skewness 1	2	3	4	5	5-1	
1	-0.93	-0.97	-1.67	-1.98	-2.20	-1.27	(**-3.42**)
2	-0.04	0.08	-0.17	-0.18	-0.22	-0.18	(-0.72)
3	0.34	0.99	0.67	0.62	0.52	0.18	(0.54)
4	1.11	1.01	1.23	0.91	1.43	0.32	(0.70)
5	1.21	1.73	1.77	2.57	2.39	1.18	(**2.42**)
5-1	2.14	2.70	3.44	4.55	4.59		
	(**4.04**)	(**4.75**)	(**5.14**)	(**5.73**)	(**6.00**)		

Panel D: Relative Signed Jump Variation

Loss QRP	Relative Signed Jump Variation 1	2	3	4	5	5-1	
1	-2.47	-1.41	-1.28	-1.30	-1.15	1.33	(**2.70**)
2	-0.25	0.06	0.03	0.05	-0.12	0.13	(0.54)
3	0.77	0.41	0.79	0.52	0.44	-0.33	(-1.06)
4	0.96	0.99	0.90	0.66	1.32	0.36	(0.69)
5	1.59	1.41	1.38	1.48	1.71	0.12	(0.23)
5-1	4.06	2.82	2.66	2.78	2.86		
	(**5.84**)	(**4.95**)	(**4.37**)	(**5.22**)	(**4.33**)		

Table B24: Conditional Double Sorts on Other Firm Characteristics: Gain QRP

In each of the four panels of the table, stocks are sorted every month in quintiles based on four different firm characteristics: illiquidity, idiosyncratic volatility, risk neutral skewness, and relative signed jump variation, respectively. Then, stocks within each quintile are further sorted in quintiles based on their gain quadratic risk premium. Illiquidity is measured as in Amihud (2002). Idiosyncratic volatility is estimated following Ang, Hodrick, Xing and Zhang (2006). Risk neutral skewness is estimated following Bakshi, Kapadia and Madan (2003). Relative signed jump variation is estimated following Bollerslev, Li and Zhao (forthcoming). T-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Data are from January 1996 to December 2015.

Panel A: Option Illiquidity

Gain QRP	Option Illiquidity 1	2	3	4	5	5-1	
1	-1.45	-1.70	-1.14	-0.99	-1.54	-0.09	(-0.40)
2	-0.22	0.01	-0.03	-0.20	-0.13	0.09	(0.53)
3	0.42	0.19	0.39	0.42	0.58	0.16	(0.92)
4	0.85	0.75	0.44	0.73	0.69	-0.16	(-0.82)
5	2.46	1.49	1.50	1.27	2.22	-0.24	(-0.68)
5-1	3.91	3.19	2.64	2.26	3.76		
	(5.68)	**(4.40)**	**(4.29)**	**(4.54)**	**(5.44)**		

Panel B: Idiosyncratic Volatility

Gain QRP	Idiosyncratic Volatility 1	2	3	4	5	5-1	
1	-0.55	-0.90	-1.05	-2.20	-3.62	-3.07	**(-5.77)**
2	-0.05	-0.29	-0.58	-0.37	-1.26	-1.21	**(-2.55)**
3	0.24	0.15	-0.04	0.03	-0.21	-0.44	(-0.95)
4	0.79	0.53	0.46	0.55	0.84	0.05	(0.10)
5	0.63	0.98	1.44	1.84	2.22	1.59	**(2.25)**
5-1	1.18	1.87	2.48	4.03	5.84		
	(3.36)	**(4.26)**	**(5.51)**	**(6.82)**	**(5.99)**		

Panel C: Risk Neutral Skewness

Gain QRP	Risk Neutral Skewness 1	2	3	4	5	5-1	
1	-0.88	-1.01	-1.30	-1.80	-2.00	-1.12	**(-3.45)**
2	-0.07	-0.08	-0.22	-0.36	-0.18	-0.10	(-0.41)
3	0.36	0.61	0.51	0.30	0.45	0.09	(0.42)
4	0.39	0.53	0.36	1.17	0.62	0.23	(0.62)
5	0.87	1.56	1.78	1.97	2.49	1.62	**(3.42)**
5-1	1.75	2.57	3.08	3.78	4.49		
	(3.33)	**(5.93)**	**(4.66)**	**(6.60)**	**(6.85)**		

Panel D: Relative Signed Jump Variation

Gain QRP	Relative Signed Jump Variation 1	2	3	4	5	5-1	
1	-1.90	-1.24	-1.36	-1.36	-1.42	0.49	(1.32)
2	-0.48	-0.35	-0.03	-0.27	-0.16	0.31	(0.90)
3	0.66	0.46	0.30	0.49	0.28	-0.38	(-1.43)
4	0.53	0.44	0.71	0.50	0.34	-0.19	(-0.55)
5	1.36	1.80	1.25	1.44	1.90	0.54	(1.09)
5-1	3.26	3.05	2.62	2.79	3.31		
	(5.84)	**(5.12)**	**(5.40)**	**(3.54)**	**(4.77)**		

Table B25: Conditional Double Sorts on ILLIQ and QRP

Stocks are sorted every month in quintiles based on illiquidity (ILLIQ) measured as in Amihud (2002). Then, stocks within each quintile of ILLIQ are further sorted in quintiles based on their loss QRP in Panel A, and gain QRP in Panel B. The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintile. We also report the difference in average excess returns between the top and the bottom quintile (5-1). t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. The sample period is from January 1996 to December 2015.

Panel A: Illiquidity and Loss QRP

Loss QRP	Illiquidity 1	2	3	4	5	5-1	
1	-0.75	-1.24	-1.64	-2.32	-3.09	-2.34	(**-4.99**)
2	-0.01	0.24	-0.00	0.08	-0.41	-0.41	(-1.15)
3	0.15	0.35	0.47	0.41	0.72	0.56	(1.55)
4	0.50	0.83	0.82	0.99	1.62	1.12	(**3.61**)
5	1.09	1.51	1.51	2.10	1.84	0.75	(1.71)
5-1	1.84	2.75	3.16	4.42	4.93		
	(**4.96**)	(**6.99**)	(**7.23**)	(**8.53**)	(**9.50**)		

Panel B: Illiquidity and Gain QRP

Gain QRP	Illiquidity 1	2	3	4	5	5-1	
1	-0.77	-0.76	-1.54	-1.74	-2.31	-1.53	(**-3.88**)
2	0.03	0.04	-0.31	-0.51	-0.67	-0.70	(**-2.36**)
3	0.39	0.13	0.45	0.07	-0.12	-0.51	(-1.58)
4	0.45	0.82	0.49	1.01	0.77	0.31	(0.85)
5	0.90	1.55	2.19	2.55	2.79	1.89	(**3.91**)
5-1	1.67	2.32	3.73	4.29	5.09		
	(**4.96**)	(**6.00**)	(**7.77**)	(**8.41**)	(**10.87**)		

Table B26: Conditional Double Sorts on CVRG and QRP

Stocks are sorted every month in quintiles based on the log of the number of analysts covering the stock (CVRG). Then, stocks within each quintile of CVRG are further sorted in quintiles based on their loss QRP in Panel A, and gain QRP in Panel B. The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintile. We also report the difference in average excess returns between the top and the bottom quintile (5-1). *t*-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant *t*-statistics at the 95% confidence level are boldfaced. The sample period is from January 1996 to December 2015.

Panel A: CVRG and Loss QRP

		CVRG						
		1	2	3	4	5	5-1	
Loss QRP	1	-2.19	-2.25	-1.82	-0.83	-0.80	1.39	(**2.96**)
	2	-0.21	-0.02	0.13	-0.19	0.06	0.27	(0.89)
	3	0.48	0.51	0.48	0.28	0.27	-0.21	(-0.60)
	4	0.81	0.90	1.08	0.67	0.80	-0.01	(-0.02)
	5	1.38	1.98	1.84	1.46	1.01	-0.36	(-0.81)
	5-1	3.57	4.23	3.66	2.30	1.82		
		(**6.81**)	(**6.82**)	(**7.98**)	(**4.83**)	(**4.63**)		

Panel B: CVRG and Gain QRP

		CVRG						
		1	2	3	4	5	5-1	
Gain QRP	1	-2.44	-1.94	-0.99	-0.86	-0.83	1.61	(**3.87**)
	2	-0.59	-0.34	-0.07	-0.22	-0.03	0.56	(1.81)
	3	0.12	0.37	0.19	0.26	0.61	0.49	(1.57)
	4	0.61	0.71	0.62	0.44	0.28	-0.32	(-0.91)
	5	2.08	2.04	1.63	1.42	1.07	-1.01	(**-2.05**)
	5-1	4.52	3.98	2.62	2.28	1.90		
		(**8.63**)	(**7.31**)	(**5.83**)	(**5.27**)	(**5.43**)		

Table B27: Conditional Double Sorts on MAX and QRP

Stocks are sorted every month in quintiles based on their maximum daily return during the previous month (MAX, Bali, Cakici and Whitelaw; 2011). Then, stocks within each quintile of MAX are further sorted in quintiles based on their loss QRP in Panel A, and gain QRP in Panel B. The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintile. We also report the difference in average excess returns between the top and the bottom quintile (5-1). t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. The sample period is from January 1996 to December 2015.

Panel A: MAX and Loss QRP

		MAX						
Loss QRP		1	2	3	4	5	5-1	
	1	-0.42	-0.76	-1.29	-2.54	-3.56	-3.14	(**-5.09**)
	2	0.16	-0.15	-0.06	-0.69	-0.79	-0.95	(-1.89)
	3	0.40	0.32	0.49	0.44	0.77	0.37	(0.73)
	4	0.83	0.74	0.98	0.68	0.75	-0.08	(-0.19)
	5	1.22	1.36	2.41	2.10	1.88	0.66	(0.90)
	5-1	1.64	2.13	3.70	4.64	5.43		
		(**5.31**)	(**5.96**)	(**7.01**)	(**7.37**)	(**7.23**)		

Panel B: MAX and Gain QRP

		MAX						
Gain QRP		1	2	3	4	5	5-1	
	1	-0.00	-0.56	-0.81	-1.91	-2.78	-2.78	(**-5.22**)
	2	0.36	0.11	0.06	-0.23	-0.55	-0.92	(**-2.12**)
	3	0.62	0.78	0.77	0.19	0.28	-0.34	(-0.72)
	4	1.14	0.90	1.12	0.98	1.01	-0.13	(-0.27)
	5	1.23	1.55	2.41	2.00	2.34	1.11	(1.67)
	5-1	1.23	2.10	3.22	3.91	5.12		
		(**3.78**)	(**5.79**)	(**6.30**)	(**7.83**)	(**8.31**)		

Table B28: Unconditional Double Sorts on Loss and Gain Firm QRP

Stocks are sorted every month in quintiles independently based on loss (QRP^l) and gain QRP (QRP^g). Then, we form portfolios by taking the intersection of these quintiles. The table reports average value-weighted excess returns for the bottom quintile (1), the top quintile (5) and for the second (2), third (3) and fourth (4) quintile. We also report the difference in average excess returns between the top and the bottom quintile (5-1). t-statistics are computed using Newey and West (1987) standard errors, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. Data are from January 1996 to December 2015.

Unconditional Double Sorts on Loss and Gain QRP

		Gain QRP						
		1	2	3	4	5	5-1	
Loss QRP	1	-3.74	-1.28	-0.48	-0.74	-0.86	2.89	(**5.17**)
	2	-1.48	-0.50	0.37	0.26	0.90	2.38	(**4.71**)
	3	-0.68	-0.07	0.62	0.76	2.31	2.99	(**6.96**)
	4	-0.24	0.39	0.98	1.28	2.90	3.14	(**6.00**)
	5	-0.48	0.76	0.53	1.50	4.87	5.34	(**10.19**)
	5-1	3.26	2.04	1.01	2.24	5.72		
		(**5.53**)	(**5.22**)	(**2.75**)	(**4.65**)	(**9.74**)		

Table B29: Univariate Sorts on Firm QRP Nonsynchronicity

In Panel A, at the end of month t we sort firms with beginning of month t stock price higher than 5 USD into quintiles based on their average loss QRP (QRP^l) during month t, so that Quintile 1 contains the stocks with the lowest QRP^l and Quintile 5 the highest. We then form value-weighted portfolios of these firms, holding the ranking constant for the next month. Subsequently, we compute cumulative returns during month $t+1$ for each quintile portfolio. We report the monthly average cumulative return in percentage of each portfolio. Similarly, in Panel B, we sort firms into quintiles based on their average gain QRP (QRP^g). We also compute the Jensen alpha of each quintile portfolio with respect to the Fama-French five-factor model (Fama and French; 2015) by running a time-series regression of the monthly portfolio returns on monthly MKT, SMB, HML, RMW, and CMA. The t-statistics test the null hypothesis that the average monthly cumulative return of each respective portfolio equals zero, and they are computed using Newey and West (1987) standard errors to account for autocorrelation, and are reported in parentheses. Significant t-statistics at the 95% confidence level are boldfaced. QRP is reported in monthly square percentage units. Data are from April 2008 to December 2015.

	Panel A: Firm Loss QRP							Panel B: Firm Gain QRP					
	Quintiles							Quintiles					
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
QRP^l	-94.43	16.33	36.82	65.21	235.97		QRP^g	-46.02	3.89	17.81	37.47	140.46	
$\mathbb{E}[r]$	-0.74	0.20	0.62	0.74	1.60	2.34		-0.78	0.13	0.50	0.86	1.73	2.51
	(-0.76)	(0.44)	(1.10)	(1.10)	(**2.33**)	(**3.73**)		(-1.11)	(0.22)	(0.92)	(1.28)	(1.84)	(**4.34**)
alpha	-1.63	-0.41	-0.13	-0.16	0.69	2.32		-1.50	-0.53	-0.20	-0.01	0.67	2.16
	(-**3.52**)	(-**3.67**)	(-1.10)	(-0.87)	(**2.08**)	(**3.11**)		(-**5.72**)	(-**4.69**)	(-1.41)	(-0.10)	(**2.01**)	(**4.13**)