Internet Appendix to "Losing is Optional: Retail Options Trading and Earnings Announcement Volatility"

July 28, 2022

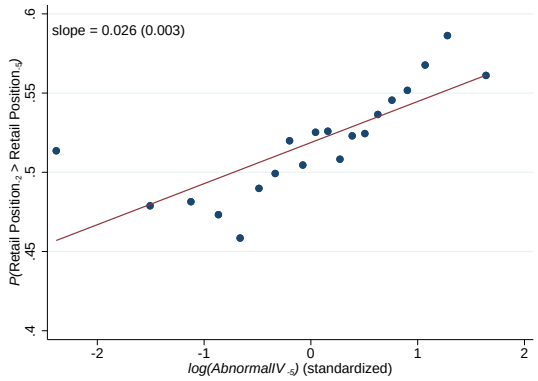
This Internet Appendix contains the following additional results to supplement the main draft of "Losing is Optional: Retail Options Trading and Earnings Announcement Volatility":

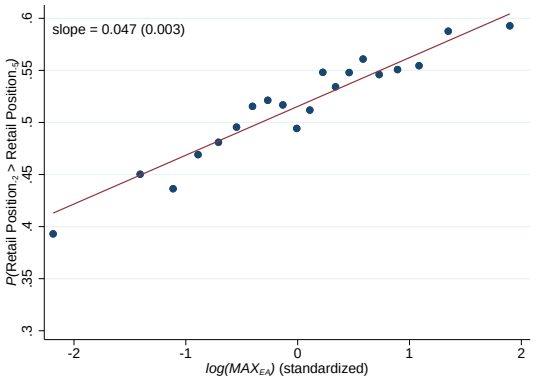
- Figure IA1 show the relationship between EAV and the probability of retail buying around earnings announcements and pseudo-earnings announcements.
- Table IA1 shows the extent to which retail invests herd in high EAV earnings announcements.
- Table IA2 examines the relationship between EAV and retail investors' equity market trading behavior.
- Table IA3 shows the return predictability we document in the main text is not present around pseudo-announcements.
- Table IA4, Table IA5, and Table IA6 shows the return predictability we document is robust to the broader sample of all OptionMetrics announcements, is constant across quintiles of option liquidity, and is complementary to the predictability documented by Boyer and Vorkink (2014).
- Figure IA2 shows our estimate of the P&L of retail investors is robust to different measures of option prices, while Figure IA3 shows the wealth transfer we document in the main text around earnings announcements is not present on pseudo-announcement days.

Figure IA1. Predicting Rise in Retail Positions: The Role of EAs

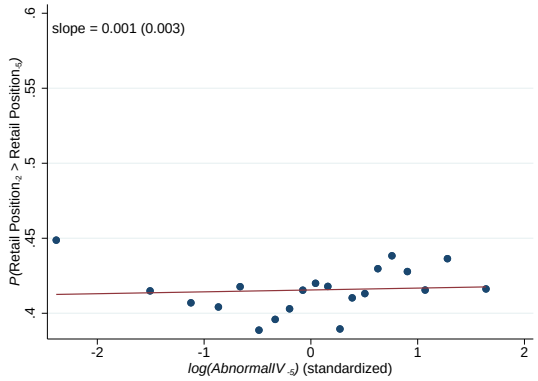
This figure displays binscatters of the probability of Retail buying versus $AbnormalIV_{-5}$ and MAX_{EA}, after taking out year-quarter fixed effects. In each figure, the average of an indicator variable for whether Retail Position$_{-2}$ is greater than Retail Position$_{-5}$ is plotted for twenty equally-spaced bins of $\log(AbnormalIV_{-5})$ along with the regression line. Panel A shows the results for actual earnings announcements. Panel B shows the results from pseudo-earnings announcements. We generate pseudo-earnings announcements by randomly shifting the announcement date by a uniform random variable distributed over $\{-22, -21, ..., -11, 11, ..., 22\}$. Trader positions are aggregated across all options that expire at least 10 days after the earnings announcement and are winsorized at 2%-98%. The top-left of each figure shows the slope coefficient and standard error from the corresponding regression using the underlying firm-quarter panel. Detailed variable definitions are given in Appendix A of the main text.

Panel A: Earnings Announcements





Panel B: Pseudo Earnings Announcements



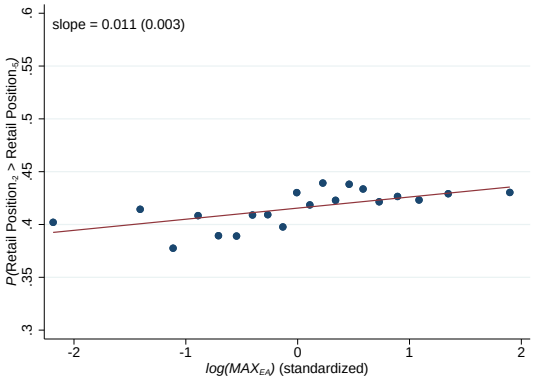


Table IA1. Retail Herding and Expected Announcement Volatility

This table displays regressions of different measures of retail herding onto our two measures of expected announcement volatility, $AbnormalIV_{-5}$ and MAX_{EA}. Retail Volume Share$_{-2}$ is calculated by dividing the Retail trading volume on a given underlying-day by the total Retail trading volume across all underlyings on that same day. Retail Buying Share$_{-2}$ is defined analogously to Retail Volume Share$_{-2}$, but by replacing all option sales with zeros. Retail Position Share$_{-2}$ is calculated by dividing the unsigned Retail position on a given underlying-day by the total unsigned Retail position across all underlyings on that same day. All three of these variables are measured at $t = -2$ in the regressions within this table. Trader positions are aggregated across all options that expire at least 10 days after the earnings announcement and are winsorized at 2%-98%. Detailed variable definitions are give in Appendix A of the main text.

	log(Retail Volume Share$_{-2}$)		log(Retail Buying Share$_{-2}$)		log(Retail Position Share$_{-2}$)	
	(1)	(2)	(3)	(4)	(5)	(6)
$log(AbnormalIV_{-5})$	0.210		0.177		0.187	
	(10.79)		(9.61)		(9.83)	
$log(MAX_{EA})$		0.483		0.416		0.341
		(8.33)		(8.17)		(5.20)
Controls	✓	✓	✓	✓	✓	✓
Year-Quarter Fixed Effects	✓	✓	✓	✓	✓	✓
Firm and Year-Quarter Clustering	✓	✓	✓	✓	✓	✓
Total Observations	22948	25661	11787	13106	23109	25839
Adjusted R-Squared	0.236	0.233	0.150	0.144	0.228	0.227

Table IA2. EAV and Retail Equity Market Trading

This table displays regressions of measures of retail trading behavior in equity markets at various days t onto our measures of EAV. To measure stock-level retail activity we use the Nasdaq Retail Trading Activity Tracker. Panel A uses the Retail Sentiment provided by Nasdaq, denoted by Signed Volume$_t$, which is calculated from the net flows of retail traders and ranges between -100 and 100, with positive (negative) numbers indicating net buying (selling) by retail traders. Panel B uses the fraction of trading volume in a given stock that comes from retail investors, denoted by Unsigned Volume$_t$, and multiplied by 100 such that it captures the percent for stock trading volume due to retail. The sample used in this figure is a subset of the sample used in our main analysis that starts on January 1st, 2016, reflecting the time period over which the data from Nasdaq are available. In columns (1) and (2) of both panels, we use the average values of these variables respectively over $t = -5$ to $t = -2$; the same is true for columns (5) and (6) for $t = 1$ to $t = 10$. Detailed variable definitions are given in Appendix A of the main text.

Panel A: Retail Signed Equity Volume

	Signed Volume$_{-5,-2}$		Signed Volume$_0$		Signed Volume$_{1,10}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$log(AbnormalIV_{-5})$	0.0974		0.161		-0.0396	
	(1.19)		(2.34)		(-0.72)	
$log(MAX_{EA})$		0.0872		0.430		-0.275
		(0.53)		(2.81)		(-2.04)
Controls	✓	✓	✓	✓	✓	✓
Year-Quarter Fixed Effects	✓	✓	✓	✓	✓	✓
Firm and Year-Quarter Clustering	✓	✓	✓	✓	✓	✓
Total Observations	13583	14548	13636	14590	14059	15074
Adjusted R-Squared	0.0111	0.0103	0.0157	0.0155	0.0145	0.0145

Panel B: Retail Unsigned Equity Volume

	Unsigned Volume$_{-5,-2}$		Unsigned Volume$_0$		Unsigned Volume$_{1,10}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$log(AbnormalIV_{-5})$	0.00313		0.0270		0.00415	
	(4.06)		(7.53)		(4.92)	
$log(MAX_{EA})$		0.0136		0.102		0.0168
		(4.90)		(8.20)		(5.60)
Controls	✓	✓	✓	✓	✓	✓
Year-Quarter Fixed Effects	✓	✓	✓	✓	✓	✓
Firm and Year-Quarter Clustering	✓	✓	✓	✓	✓	✓
Total Observations	13596	14569	13644	14604	14063	15078
Adjusted R-Squared	0.258	0.261	0.144	0.160	0.248	0.254

Table IA3. Straddle Return Predictability around Pseudo-Announcements

This table displays the results from portfolio sorts around pseudo-earnings announcements. We generate pseudo-earnings announcements by randomly shifting the announcement date by a uniform random variable distributed over $\{-22, -21, ..., -11, 11, ..., 22\}$. We then perform an identical analysis to Table 4 in the main text, using a different set of straddles chosen for each pseudo-announcement as the nearest-to-the-money straddle with the shortest maturity that expires at least 13 days after the pseudo-announcement (as we do for real announcements). Panel A shows returns using $SRET_0$ on the announcement day and Panel B shows results using $SRET_{1,10}$ around pseudo-announcements. Detailed variable definitions are given in Appendix A of the main text.

Panel A: Pseudo-Announcement-Day Portfolio Sort: $AbnormalIV_{-1}$

Univariate: mean (t-stat)		Univariate: skew (excess kurtosis)	
1 (low $AbnormalIV_{-1}$)	0.01	1 (low $AbnormalIV_{-1}$)	-0.94
2	0.01	2	-0.45
3	0.01	3	-0.27
4	0.01	4	-2.17
5 (high $AbnormalIV_{-1}$)	0.02	5 (high $AbnormalIV_{-1}$)	-0.91
5 - 1 (long-short)	0.01	5 - 1 (long-short)	0.13
	(2.63)		(1.47)

Panel B: Post-Pseudo-Announcement Portfolio Sort: $AbnormalIV_{-1}$

Univariate: mean (t-stat)		Univariate: skew (excess kurtosis)	
1 (low $AbnormalIV_{-1}$)	0.11	1 (low $AbnormalIV_{-1}$)	-1.12
2	0.10	2	-1.23
3	0.09	3	-2.28
4	0.10	4	-1.09
5 (high $AbnormalIV_{-1}$)	0.15	5 (high $AbnormalIV_{-1}$)	2.35
5 - 1 (long-short)	0.04	5 - 1 (long-short)	1.57
	(2.83)		(4.06)

Table IA4. Straddle Return Predictability: Larger Sample

This table displays the results from portfolio sorts similar to Table 4 in the main text, but using the largest possible sample of earnings announcements from intersecting CRSP, Compustat, and OptionMetrics without requiring an intersection with our Nasdaq sample. Firm-quarter observations are placed into quintiles each quarter, using quintile breakpoints from the prior quarter. We then calculate the returns for each portfolio in a given quarter by taking the equal-weighted average of $SRET_{1,10}$, for all firm-quarters in that portfolio.

Panel A: Announcement-Day Portfolio Sort: $AbnormalIV_{-1}$

Univariate: mean (t-stat)		Univariate: skew (excess kurtosis)	
1 (low $AbnormalIV_{-1}$)	0.05	1 (low $AbnormalIV_{-1}$)	0.17
2	0.06	2	0.21
3	0.08	3	0.18
4	0.11	4	0.18
5 (high $AbnormalIV_{-1}$)	0.14	5 (high $AbnormalIV_{-1}$)	-0.32
5 - 1 (long-short)	0.09 (20.21)	5 - 1 (long-short)	0.15 (-0.37)

Panel B: Post-Announcement Portfolio Sort: $AbnormalIV_{-1}$

Univariate: mean (t-stat)		Univariate: skew (excess kurtosis)	
1 (low $AbnormalIV_{-1}$)	0.10	1 (low $AbnormalIV_{-1}$)	-1.17
2	0.10	2	-0.96
3	0.13	3	-1.29
4	0.15	4	-1.21
5 (high $AbnormalIV_{-1}$)	0.17	5 (high $AbnormalIV_{-1}$)	-1.17
5 - 1 (long-short)	0.07 (9.29)	5 - 1 (long-short)	0.07 (0.24)

Table IA5. Straddle Return Predictability: Double Sorts with $skew^S_{BV}$

This table shows the results from a two-way portfolio sort on $AbnormalIV_{-1}$ and $skew^S_{BV}$, where $skew^S_{BV}$ is a measure from Boyer and Vorkink (2014) of implied skewness of the underlying stock based on historical equity returns and option prices. Firm-quarter observations are placed into quintiles of these two variables each quarter, using quintile breakpoints from the prior quarter. We then calculate the returns for each portfolio in a given quarter by taking the equal-weighted average of straddle returns for all firm-quarters in that portfolio and display the time-series mean and t-statistics (in parenthesis) of the resulting quarterly returns. Panel A (B) uses straddle returns from $t = 0$ ($t = 1, ..., 10$), defined as $SRET_t$. The sample in this table is the same as in Table IA4.

Panel A: Announcement-Day

Two-way: mean (t-stat)							
	1 (low $skew^S_{BV}$)	2	3	4	5 (high $skew^S_{BV}$)	5 - 1 (long-short)	double sort
1 (low $AbnormalIV_{-1}$)	0.04	0.05	0.05	0.06	0.08	0.04	
						(4.66)	
2	0.05	0.06	0.06	0.07	0.09	0.04	
						(4.68)	
3	0.08	0.08	0.08	0.09	0.13	0.04	
						(5.20)	
4	0.12	0.11	0.11	0.12	0.14	0.03	
						(3.19)	
5 (high $AbnormalIV_{-1}$)	0.16	0.14	0.15	0.15	0.17	0.02	
						(1.84)	
5 - 1 (long-short)	0.11	0.09	0.10	0.10	0.09		
	(14.22)	(12.36)	(12.65)	(14.36)	(8.78)		
double sort							0.13
							(13.49)

Panel B: Post-Announcement

Two-way: mean (t-stat)							
	1 (low $skew^S_{BV}$)	2	3	4	5 (high $skew^S_{BV}$)	5 - 1 (long-short)	double sort
1 (low $AbnormalIV_{-1}$)	0.09	0.10	0.10	0.13	0.13	0.03	
						(2.52)	
2	0.12	0.11	0.10	0.11	0.14	0.03	
						(1.62)	
3	0.13	0.12	0.12	0.15	0.17	0.03	
						(2.71)	
4	0.17	0.16	0.15	0.18	0.19	0.02	
						(1.13)	
5 (high $AbnormalIV_{-1}$)	0.22	0.18	0.19	0.19	0.21	-0.01	
						(-1.01)	
5 - 1 (long-short)	0.13	0.09	0.09	0.07	0.08		
	(7.47)	(7.24)	(6.51)	(4.58)	(5.08)		
double sort							0.11
							(6.86)

Table IA6. Straddle Return Predictability: Double Sorts with Option Volume

This table shows the results from a two-way portfolio sort on $AbnormalIV_{-1}$ and $Volume_{-22,-5}$. Firm-quarter observations are placed into quintiles of these two variables each quarter, using quintile breakpoints from the prior quarter. We then calculate the returns for each portfolio in a given quarter by taking the equal-weighted average of straddle returns for all firm-quarters in that portfolio and display the time-series mean and t-statistics (in parenthesis) of the resulting quarterly returns. Panel A (B) uses straddle returns from $t = 0$ ($t = 1, ..., 10$), defined as $SRET_t$. The sample in this table is the same as Table IA4.

Panel A: Announcement-Day

Two-way: mean (t-stat)							
	1 (low $Volume_{-22,-5}$)	2	3	4	5 (high $Volume_{-22,-5}$)	5 - 1 (long-short)	double sort
1 (low $AbnormalIV_{-1}$)	0.05	0.05	0.04	0.05	0.05	0.00	
						(0.34)	
2	0.07	0.06	0.06	0.06	0.06	-0.01	
						(-1.35)	
3	0.09	0.09	0.08	0.07	0.09	-0.00	
						(-0.59)	
4	0.11	0.10	0.10	0.11	0.11	-0.00	
						(-0.14)	
5 (high $AbnormalIV_{-1}$)	0.15	0.13	0.15	0.15	0.13	-0.02	
						(-2.62)	
5 - 1 (long-short)	0.10	0.08	0.10	0.10	0.08		
	(17.16)	(10.87)	(14.14)	(13.36)	(9.05)		
double sort							0.08
							(11.37)

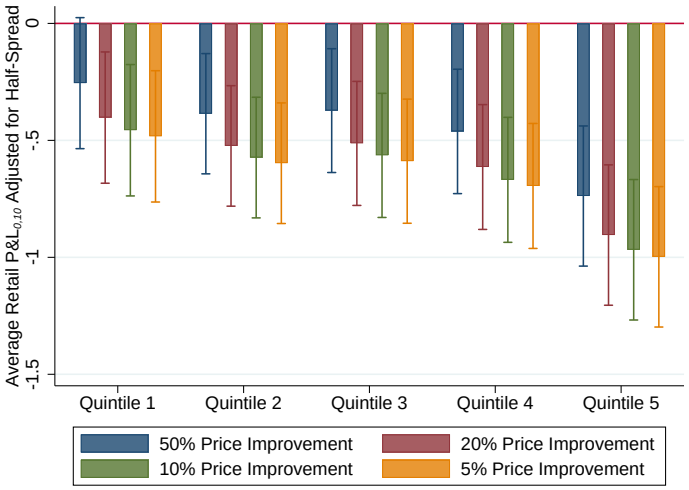
Panel B: Post-Announcement

Two-way: mean (t-stat)							
	1 (low $Volume_{-22,-5}$)	2	3	4	5 (high $Volume_{-22,-5}$)	5 - 1 (long-short)	double sort
1 (low $AbnormalIV_{-1}$)	0.12	0.11	0.10	0.09	0.08	-0.03	
						(-2.03)	
2	0.13	0.11	0.10	0.10	0.07	-0.05	
						(-4.39)	
3	0.15	0.14	0.14	0.12	0.10	-0.05	
						(-5.30)	
4	0.17	0.17	0.15	0.15	0.13	-0.04	
						(-3.17)	
5 (high $AbnormalIV_{-1}$)	0.19	0.20	0.19	0.17	0.14	-0.05	
						(-3.79)	
5 - 1 (long-short)	0.07	0.08	0.09	0.09	0.05		
	(7.08)	(7.80)	(7.55)	(7.07)	(3.07)		
double sort							0.02
							(1.52)

Figure IA2. Wealth Dynamics

This figure plots the trading performance of retail investors across quintiles of $AbnormalIV_{-1}$. Both panels plot the same graph as in Panel B of Figure 7 in the main text, but with different measures of Retail $P\&L_{0,10}$ for robustness. Panel A uses the opening price instead of closing price; Panel B using the average of the daily low and high prices. Both of these prices come from the Nasdaq dataset. Error bars in all panels represent 90% confidence intervals. For detailed variable definitions see Appendix A of the main text.

Panel A: Retail P&L Across Quintiles of $AbnormalIV_{-1}$ using Opening Price



Panel B: Retail P&L Across Quintiles of $AbnormalIV_{-1}$ using Midpoint of High and Low Prices

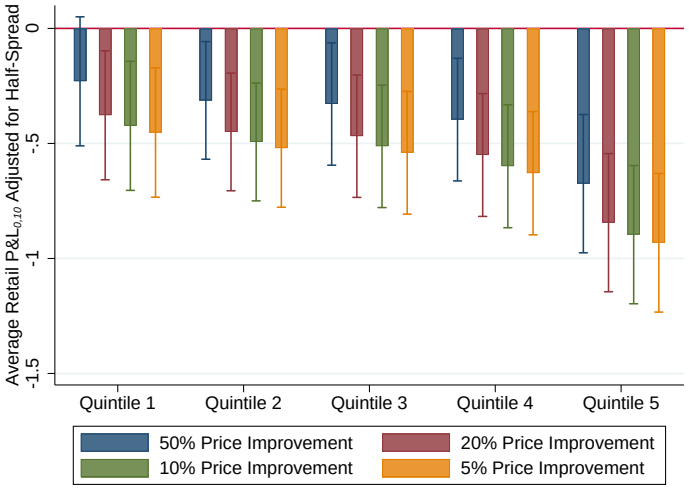
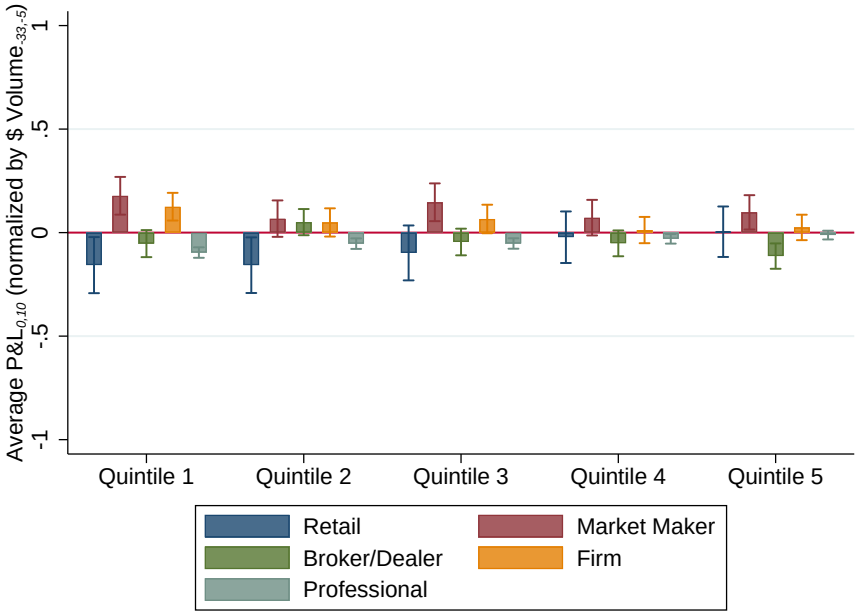


Figure IA3. Wealth Transfer around Pseudo-Announcements

This figure plots the trading performance of each trader across quintiles of $AbnormalIV_{-1}$ around pseudo-earnings-announcements. We generate pseudo-earnings announcements used in Panel B by randomly shifting the announcement date by a number of trading days equal to a uniform random variable distributed over $\{-22, -21, ..., -11, 11, ..., 22\}$. For each quintile of $AbnormalIV_{-1}$, we plot the average P&L for each trader calculated as in Figure 7 in the main text. P&L represents our estimate of the dollar change in a trader's position on market close at day t across all options that expire at least 10 days after the earnings announcement. Trader P&L is then normalized by the average daily option dollar volume on Nasdaq for $t \in [-33, -5]$ across all options on each underlying and is winsorized at 2%-98%. Error bars in all panels represent 90% confidence intervals. For detailed variable definitions see Appendix A of the main text.



References

Boyer, Brian H. and Keith Vorkink (2014), "Stock options as lotteries." *The Journal of Finance*, 69, 1485–1527.