

Internet Appendix

“Anticipating Uncertainty: Straddles Around Earnings Announcements”

Table 1. Summary Statistics for the Time Series Sample with Stricter Liquidity Filters

Our sample period is from January 1996 to December 2013. We obtain data from several data sources. Data on stock returns and firm characteristics, accounting data, and earnings announcements are obtained from CRSP, COMPUSTAT, and IBES, respectively. Data on options is from Option Metrics. We apply filter (1) to (10) to the options data. Moneyness is defined as stock price divided by strike price. In this sample, comparing to Table 1 of the paper, we further require a non-missing daily price, positive daily open interest, and positive daily volume in each event window. We compute open interest for a straddle as the number of contracts outstanding in 100's, summing open interests from both call and put in the straddle. Similarly, we compute the daily volume of a straddle as the number of contracts traded in 100's, summing daily volumes from both calls and puts in the straddle. Implied volatility for a straddle is the average of implied volatility of calls and puts in the straddle. The panels below report summary statistics on stock and straddle characteristics, which are computed over a pooled sample across firms/straddles and across time.

Panel A. Stock characteristics

	N	Mean	Median	Std
Market cap (\$ mil)	22603	16488	4539	39009
Book to market ratio	22285	0.433	0.320	0.434
Past 12 month return	22595	0.133	0.140	0.455
Past 3 month daily return volatility (annualized)	22579	0.026	0.023	0.014
Past 3 month daily return skewness	22579	0.050	0.076	1.129
Past 3 month daily return kurtosis	22579	5.644	3.847	5.261

Panel B. Straddle characteristics

	N	Mean	Median	Std
Moneyness	42080	1.010	1.007	0.027
Days to maturity	42080	36	33	13
Open interest	42080	3868	1266	9479
Volume	42080	652	103	2341
Implied volatility	42080	0.465	0.424	0.207

Table 2. Day-to-day Delta-Neutral Straddle Returns, Time Series Sample

Our sample is from January 1996 to December 2013. Data on options is from Option Metrics. We apply filter (1) to (10) to the options data. This table reports time series average daily returns on at-the-money delta-neutral straddles over different windows around earnings announcements, where day 0 is the earnings announcement day. Different from Table 3 Panel B, instead of a buy-and-hold strategy, we use the beginning value weight of the call and put options when the straddle is constructed, which assumes daily rebalance. In the event that a stock has more than one pair of at-the-money straddles, we use equal weight or volume weight for different straddle pairs for the same stock. To aggregate across stocks, we use either equal weights or use last month dollar open interest as weights across different firms. To compute time series average returns, we first compute the quarterly average return across firms, and then we average over all quarters. We compute t-statistics using Newey-West standard errors with 3 lags.

Weighting across firms within firms holding period		equal equal holding ret		equal volume holding ret		dollar open equal holding ret		dollar open volume holding ret	
day	t-stat	t-stat	t-stat	t-stat	t-stat	t-stat	t-stat	t-stat	t-stat
[-3,1]	[-3,-2]	0.70%	5.36	0.65%	4.65	0.21%	1.38	0.22%	1.50
	[-2,-1]	1.79%	13.15	1.76%	12.13	1.29%	5.81	1.34%	6.19
	[-1,0]	2.08%	4.98	1.89%	4.43	0.92%	2.34	0.81%	2.11
	[0,1]	1.18%	4.02	1.02%	3.52	-0.07%	-0.14	-0.24%	-0.44
[-1,1]	[-1,0]	2.13%	6.07	1.88%	5.04	0.43%	1.39	0.40%	1.20
	[0,1]	1.14%	4.30	0.95%	3.41	-0.37%	-0.86	-0.36%	-0.71

Table 3. Delta-Neutral Straddle Returns over [-3,0], Time-Series Sample, Equal Weight Across Firms

Our sample is from January 1996 to December 2013. Data on options is from Option Metrics. We apply filter (1) to (10) to the options data. Straddles are computed over [-3,0], relative to the earnings announcement days. In the event that a stock has more than one pair of short-term at-the-money straddles, we adopt volume weighting. Each quarter, we sort all firms into 4 groups based on previous period stock characteristics, and we average firm-level straddle returns for each of the four groups using equal weights. The means and t-statistics are computed over 72 quarters for each of the 4 groups. We compute t-statistics using Newey-West standard errors with 3 lags.

Panel A. Different Industries

industry	N(firms)	Holding period return	t-stat
Non-Durables	13	1.32%	1.34
Durables	8	2.76%	2.06
Manufacturer	36	2.73%	2.68
Energy	19	1.90%	2.64
Chemicals	12	1.35%	1.24
Business Equipment	67	4.48%	9.45
Telecom	5	3.94%	1.59
Utilities	9	0.71%	0.29
Shops	45	3.19%	3.81
Health Care	25	3.02%	2.93
Money	32	1.78%	2.13
Other	45	3.41%	5.32

Panel B. Commonly Used Stock Characteristics

	size		BM		past return	
	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat
low	5.01%	7.42	2.81%	4.43	3.72%	6.13
2	4.42%	5.99	2.68%	4.59	2.30%	3.61
3	2.27%	4.95	3.19%	5.23	2.78%	4.96
high	0.93%	1.38	3.42%	4.67	3.48%	4.39
high - low	-4.08%	-4.95	0.61%	0.96	-0.24%	-0.30

Panel C. Commonly Used Options Characteristics

	Days to maturity		Put call ratio		Hist. vol-IMPLIED vol	
	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat
low	3.88%	5.29	3.46%	5.15	2.52%	4.97
2	1.95%	2.97	3.43%	4.77	2.81%	4.62
3	2.38%	3.34	2.34%	4.36	4.02%	5.25
high	3.13%	7.35	2.23%	4.92	2.86%	4.01
high - low	-0.75%	-1.43	-1.24%	-2.02	0.34%	0.47

Table 4. Delta-Neutral Straddle Returns over [-3,-1], Time-Series Sample, Dollar Open Interest Weighted across Firms

Our sample is from January 1996 to December 2013. Data on options is from Option Metrics. We apply filter (1) to (10) to the options data. Straddles are computed over [-3,-1], relative to earnings announcement days. In the event that a stock has more than one pair of short term at-the-money straddles, we adopt volume weighting. Each quarter, we sort all firms into 4 groups based on previous period stock characteristics, and we average firm-level straddle returns for each of the four groups using the previous quarter end dollar open interest as a weight for each stock. The means and t-statistics for each group are computed over 72 quarters for each of the four groups. We compute t-statistics using Newey-West standard errors with 3 lags.

Panel A. Different Industries

industry	N(firms)	Holding return	t-stat
Non-Durables	13	0.12%	0.15
Durables	8	4.06%	3.14
Manufacturer	36	1.78%	2.23
Energy	19	1.63%	1.81
Chemicals	12	1.26%	1.63
Business Equipment	67	1.39%	2.53
Telecom	5	3.50%	2.53
Utilities	9	0.72%	0.76
Shops	45	2.24%	4.43
Health Care	25	0.86%	1.30
Money	32	1.35%	1.71
Other	45	2.35%	3.69

Panel B. Commonly Used Stock Characteristics

	size		BM		past return	
	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat
low	2.15%	5.16	1.87%	3.20	2.00%	4.58
2	2.03%	4.98	1.04%	2.38	1.29%	1.96
3	1.68%	4.78	0.72%	1.60	1.60%	4.33
high	1.24%	2.55	2.62%	4.02	1.40%	2.51
high - low	-0.91%	-1.96	0.74%	0.97	-0.60%	-0.91

Panel C. Commonly Used Options Characteristics

	Days to maturity		Put call ratio		Hist. vol-IMPLIED vol	
	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat
low	3.33%	7.17	1.83%	2.84	0.90%	1.71
2	0.39%	0.77	2.04%	3.21	0.90%	1.95
3	1.33%	2.55	1.40%	2.88	1.67%	2.86
high	2.02%	5.31	0.83%	1.91	1.80%	4.07
high - low	-1.31%	-4.19	-1.00%	-1.09	0.90%	1.46

Table 5. Daily Fama-MacBeth WLS Regressions, Time-Series Sample

Our sample is from January 1996 to December 2013. Data on options is from Option Metrics. We apply filter (1) to (10) to the options data. Day 0 is the earnings announcement day. If there is more than one straddle for a stock over one period, we use volume weighting. Every day, we estimate a cross-sectional regression for straddle return. Then, we average all daily coefficients over all the days to conduct inferences. Historical moments are computed over past 3-month daily returns, and historical jump statistics using the past 12-month daily returns. The cumulative abnormal return, CAR, is computed over $[-1, 1]$ around earnings announcements and adjusted for market return. Earnings surprises, SUE, are calculated as the difference between announced earnings and consensus forecast. The variance of SUE and CAR are computed using data from the previous 8 quarters. We rely on a variable reduction technique to choose variables to include in the last regression. We compute t-statistics using Newey-West standard errors with 3-lags.

	I		II		III		IV		V		VI	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Intercept	-0.003	-0.19	0.002	2.03	-0.004	-3.11	0.000	0.39	-0.112	-1.24	0.001	2.06
Event Day Dummy, Day -2	0.006	7.58	0.006	7.35	0.004	4.93	0.007	8.19	0.005	5.01	0.006	7.28
Event Day Dummy, Day -1	0.014	15.16	0.012	13.39	0.009	11.48	0.014	15.00	0.010	9.80	0.012	13.88
Event Day Dummy, Day 0	0.009	4.98	0.006	3.58	0.003	2.14	0.007	3.85	0.005	3.17	0.006	3.54
Event Day Dummy, Day +1	0.002	0.92	0.003	1.69	0.005	2.79	-0.001	-0.36	0.003	1.61	0.001	0.40
DAYS_TO_MATURITY	0.000	1.17							0.000	1.69		
MONEYNESS	-0.006	-0.38							0.089	1.07		
ln(SIZE)	0.001	4.49							0.000	0.26		
ln(B/M)	0.000	1.85							-0.004	-0.57		
PAST_RETURN	0.001	2.24							-0.017	-1.15		
ln(KURTOSIS)			-0.001	-2.85					-0.001	-0.50		
JUMP_FREQ			-0.100	-2.23					1.065	1.22	-0.174	-4.99
JUMP_SIZE			0.000	-0.10					-0.009	-0.98		
N_ANALYSTS					0.000	2.84						
Var(CAR)					0.006	0.69			-0.046	-0.79		
Var(SUE)					0.639	2.07			-0.064	-0.62		
OPTION_VOLUME							0.000	-0.66	0.000	1.02		
OPTION_SPREAD							-0.002	-0.63	0.019	2.97		
STOCK_SPREAD							-0.535	-3.80	-0.484	-2.08	-0.351	-2.29
R ²	17.00%		12.90%		18.06%		9.50%		45.59%		8.49%	
Adj. R ²	13.90%		9.10%		11.61%		7.30%		31.74%		5.90%	

Table 6. Noise and Transaction Costs, Delta-Neutral Straddle Returns over [-3,-1], Dollar Open Interest Weighted, Time Series Sample

Our sample is from January 1996 to December 2013. Data on options is from Option Metrics. We apply filter (1) to (10) to the options data. Straddles are computed over [-3,-1], relative to the earnings announcement days. In the event a stock has more than one pair of short term at-the-money straddles, we adopt volume weighting. Each quarter, we sort all firms into 4 groups based on previous period characteristics, and we average firm-level straddle returns for each of the four groups. The means and t-statistics for each group are computed over 72 quarters. We compute t-statistics using Newey-West standard errors with 3 lags.

Panel A. sort on past high moments and jumps

	volatility		skewness		kurtosis		jump freq		jump size	
	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat
low	1.07%	2.22	1.09%	2.16	0.56%	1.30	1.00%	1.33	1.56%	3.09
2	1.68%	3.12	1.34%	2.47	1.76%	4.02	1.84%	3.00	1.60%	3.60
3	1.17%	2.51	1.27%	3.23	1.55%	3.16	1.81%	3.12	2.41%	4.53
high	1.40%	2.51	1.88%	2.64	2.06%	3.10	1.93%	2.49	1.49%	2.05
high - low	0.33%	0.47	0.80%	0.97	1.50%	2.05	0.93%	0.80	-0.07%	-0.09

Panel B. sort on past earnings surprises

	N analyst		SUE		CAR		Var(SUE)		Var(CAR)	
	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat
low	2.57%	4.79	1.96%	2.05	1.21%	1.91	1.42%	2.85	0.89%	2.62
2	2.34%	4.02	1.29%	2.11	1.23%	1.86	1.25%	1.83	1.70%	2.62
3	0.91%	3.31	0.94%	1.40	1.39%	2.48	1.40%	1.83	1.60%	2.94
high	1.41%	2.11	1.83%	4.19	2.00%	2.91	1.70%	3.21	1.92%	2.71
high - low	-1.16%	-1.73	-0.14%	-0.15	0.79%	1.42	0.29%	0.41	1.03%	1.40

Panel C. sort on past transaction costs

	stock spread		stock volume		option spread		option volume	
	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat	holding ret	t-stat
low	1.21%	2.09	2.98%	7.93	1.15%	2.16	3.50%	6.85
2	1.39%	4.21	2.18%	7.03	1.37%	4.64	2.18%	5.62
3	2.32%	3.61	2.31%	5.94	2.10%	4.37	1.92%	4.74
high	0.98%	1.81	1.07%	2.40	3.73%	7.13	1.20%	2.63
high - low	-0.24%	-0.35	-1.91%	-3.33	2.58%	3.08	-2.30%	-3.40