Disagreement in the Equity Options Market and Stock Returns

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2023-10-30

结论

- 投资者分歧降低股票未来收益率
- 盈利与预期偏差，投资者分歧和未来预期收益率的相关性
- 在高贝塔、难以卖空的股票中更明显，二者相关性

数据来源

- Chicago Board of Options Exchange (CBOE)

  International Securities Exchange (ISE)

- 交易者

1. Customers：散户和机构投资者（对冲基金）
2. Firms：Proprietary Trading Desks(和做市商的相关性0.44)

核心变量

- 将投资者分歧定义为合成股票多头敞口和空头敞口的抵消程度

$$Disagreement = Min(POS, NEG)$$

$$POS = \sum |\Delta^{Call}| \left(OB^{Call} + CB^{Call}\right) + |\Delta^{Put}| \left(OS^{Put} + CS^{Put}\right)$$

$$NEG = \sum |\Delta^{Put}| \left(OB^{Put} + CB^{Put}\right) + |\Delta^{Call}| \left(OS^{Call} + CS^{Call}\right)$$

- 标准化

$$Disagreement = \frac{Min(POS, NEG)}{Max(POS, NEG)}$$

- 去除开盘卖出看涨期权的成交量

$$DisagreementSC = \frac{Min(POS, NEG^{SC})}{Max(POS, NEG^{SC})}$$

$$NEG^{SC} = \sum |\Delta^{Put}| \left(OB^{Put} + CB^{Put}\right) + |\Delta^{Call}| \left(CS^{Call}\right)$$

控制变量

- 经标准化后的投资者方向性指标

$$Directional = \begin{cases} [Max(POS, NEG) - Min(POS, NEG)] & if\ POS \geq NEG \\ [Max(POS, NEG) - Min(POS, NEG)] \times -(1) & if\ POS < NEG \end{cases}$$

$$Directional = \frac{Directional}{Max(POS, NEG)}$$

- 其余投资者分歧指标：分析师预测离散度、换手率和共同基金持股分散度
- 和股票特征相关的指标：市值、账面市值比、异质性波动率、动量和机构持有量等
- 和期权特征相关的指标：期权未平仓量、期权交易量、Put-call交易量比值、隐含波动率、隐含偏度和Call-put波动率价差等

描述性统计

表1 描述性统计

	Mean	Median	Min	Max	SD	N
Disagreement	1	2	3	4	5	6
Directional	1	2	3	4	5	6
AnalystDis	1	2	3	4	5	6
Disagreement	1	2	3	4	5	6
Directional	1	2	3	4	5	6
AnalystDis	1	2	3	4	5	6
Disagreement	1	2	3	4	5	6
Directional	1	2	3	4	5	6
AnalystDis	1	2	3	4	5	6
Disagreement	1	2	3	4	5	6
Directional	1	2	3	4	5	6
AnalystDis	1	2	3	4	5	6

投资组合收益率

Table 3
Monthly portfolio sorts (value-weighted portfolios)

	All stocks				500 largest stocks		
A. Disagreement							
	Raw ret	Alpha	*t*-stat		Raw ret	Alpha	*t*-stat
Low	9.20	1.51	1.83	Low	9.33	2.36	2.52
2	9.55	1.84	2.23	2	8.62	1.37	1.53
3	9.15	1.60	2.16	3	8.71	1.71	1.83
4	8.24	0.67	0.91	4	6.69	−0.30	−0.39
High	6.68	−1.12	−2.55	High	6.95	−1.29	−1.52
High-low	−2.52	−2.62	−2.44	High-low	−2.39	−3.65	−2.53
Panel B: DisagreementSC							
	Raw ret	Alpha	*t*-stat		Raw ret	Alpha	*t*-stat
Low	9.96	2.41	3.29	Low	10.77	4.03	4.88
2	8.60	0.99	1.20	2	8.87	1.80	1.88
3	10.01	2.52	3.06	3	8.37	1.09	1.35
4	8.14	0.55	0.78	4	6.38	−0.96	−1.33
High	6.42	−1.48	−2.78	High	6.33	−1.83	−2.05
High-low	−3.54	−3.89	−3.70	High-low	−4.43	−5.86	−4.19

投资组合收益率

C. DisagreementSC (w/o 2008–2009)

	Raw ret	Alpha	*t*-stat		Raw ret	Alpha	*t*-stat
Low	11.72	2.66	3.76	Low	12.65	4.10	4.75
2	10.63	1.31	1.50	2	10.33	1.34	1.38
3	10.77	1.42	1.76	3	10.81	1.13	1.54
4	10.67	0.83	1.22	4	9.15	−0.78	−1.10
High	9.25	−1.55	−2.67	High	9.65	−1.57	−1.54
High-low	−2.48	−4.21	−3.98	High-low	−3.00	−5.67	−3.52

D. AnalystDis

	Raw ret	Alpha	*t*-stat		Raw ret	Alpha	*t*-stat
Low	7.46	0.43	0.95	Low	6.05	−0.60	−0.66
2	9.40	0.46	0.40	2	8.62	1.52	1.70
3	8.35	−0.79	−0.46	3	9.92	1.96	1.77
4	8.74	−0.92	−0.55	4	8.70	−0.20	−0.14
High	7.54	−0.91	−0.43	High	9.44	0.20	0.09
High-low	0.08	−1.34	−0.60	High-low	3.39	0.80	0.26

This table reports results for monthly portfolio sorts based on options disagreement (Disagreement), options disagreement that excludes written calls (DisagreementSC), and analysts' forecast dispersion (AnalystDis). Results are reported separately for all stocks (left panels) and for the subsample of the 500 largest stocks (right panels). Portfolio returns are value-weighted and annualized. Portfolio alphas are evaluated using a four-factor Fama-French-Carhart model and Newey-West *t*-statistics with three lags. The sample period is from January 2005 to December 2018.

Fama-MacBeth对下月月度收益率

	All stocks				500 largest stocks		
				w/o 2008–2009			w/o 2008–2009
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Disagreement	-0.0059***	-0.0048***			-0.0054***		
	(-3.46)	(-2.88)			(-2.88)		
DisagreementSC			-0.0053***	-0.0042**		-0.0066***	-0.0042**
			(-3.04)	(-2.49)		(-3.15)	(-2.09)
Directional		0.0047***	0.0035***	0.0034***	0.0045***	0.0028**	0.0029***
		(5.78)	(4.48)	(4.29)	(3.87)	(2.58)	(2.68)
AnalystDis		-0.0402**	-0.0412***	-0.0399***	0.2026	0.1986	0.2738
		(-2.57)	(-2.62)	(-2.64)	(0.84)	(0.82)	(1.08)
StockTurn		-0.0020	-0.0016	-0.0016	0.0072	0.0082	0.0085
		(-0.55)	(-0.44)	(-0.40)	(1.12)	(1.28)	(1.18)
MFDis		-0.1112	-0.1029	-0.0888	-0.0568	-0.0456	0.0467
		(-0.98)	(-0.91)	(-0.84)	(-0.42)	(-0.33)	(0.37)
log(Size)		-0.0002	-0.0003	-0.0001	0.0002	0.0001	-0.0004
		(-0.38)	(-0.51)	(-0.18)	(0.17)	(0.14)	(-0.47)
log(BM)		-0.0009	-0.0009	-0.0007	-0.0009	-0.0009	0.0001
		(-0.99)	(-1.04)	(-0.77)	(-0.88)	(-0.99)	(0.16)
Ret(t)		-0.0063	-0.0064	-0.0047	-0.0031	-0.0024	0.0034
		(-0.96)	(-0.96)	(-0.70)	(-0.33)	(-0.26)	(0.36)
Ret(t-1)		0.0087	0.0084	0.0130*	0.0006	0.0004	0.0088
		(1.35)	(1.31)	(1.92)	(0.06)	(0.05)	(0.87)
IdiosyncVol		0.0025	0.0016	0.0039	-0.0340	-0.0326	-0.0162
		(0.16)	(0.10)	(0.25)	(-1.11)	(-1.08)	(-0.65)
Mom		-0.0023	-0.0022	0.0014	-0.0010	-0.0010	0.0015
		(-0.67)	(-0.65)	(0.71)	(-0.30)	(-0.29)	(0.52)
OP		0.0004	0.0004	0.0004	0.0003	0.0004	0.0001
		(1.10)	(1.11)	(1.18)	(0.54)	(0.59)	(0.22)
INV		-0.0016*	-0.0017*	-0.0018*	0.0008	0.0007	0.0003
		(-1.83)	(-1.85)	(-1.91)	(0.65)	(0.56)	(0.26)

Fama-MacBeth对下月月度收益率

ESS		0.3289	0.3770	-0.0626	5.2352**	5.2974**	2.2505
		(0.45)	(0.51)	(-0.09)	(2.29)	(2.28)	(1.19)
SOI		0.0103	0.0101	0.0107	0.0249*	0.0231*	0.0103
		(1.25)	(1.22)	(1.27)	(1.91)	(1.79)	(0.98)
PIN		-0.0011	0.0002	0.0099	-0.0001	-0.0012	-0.0060
		(-0.10)	(0.02)	(1.00)	(-0.01)	(-0.08)	(-0.44)
InstOwner		0.0012	0.0016	-0.0009	-0.0012	-0.0010	-0.0041
		(0.46)	(0.61)	(-0.37)	(-0.33)	(-0.27)	(-1.29)
OpenInterest		-0.0020	-0.0021	-0.0035	-0.0024	-0.0031	-0.0048
		(-0.71)	(-0.75)	(-1.17)	(-0.56)	(-0.72)	(-1.10)
OptVolume		0.0142	0.0166	0.0277	-0.0376	-0.0348	-0.0398
		(0.56)	(0.66)	(1.00)	(-0.82)	(-0.75)	(-0.81)
OOI		5.9555	7.5398	7.8578	-22.9502	-20.1279	-29.0811
		(0.88)	(1.16)	(1.06)	(-1.30)	(-1.14)	(-1.55)
PP		-0.0035**	-0.0034*	-0.0020	-0.0012	-0.0008	0.0010
		(-2.02)	(-1.91)	(-1.25)	(-0.45)	(-0.31)	(0.44)
OS		-0.0007*	-0.0006	-0.0006	-0.0007	-0.0004	-0.0004
		(-1.67)	(-1.50)	(-1.42)	(-1.02)	(-0.68)	(-0.73)
EOS		-0.0120	-0.0117	-0.0207	-0.0443**	-0.0451**	-0.0494**
		(-0.72)	(-0.70)	(-1.31)	(-2.04)	(-2.08)	(-2.23)
ImVol		0.0015	0.0011	-0.0008	-0.0097	-0.0089	-0.0042
		(0.15)	(0.11)	(-0.08)	(-0.66)	(-0.60)	(-0.28)
CP-vol-spread		0.0419***	0.0420***	0.0499***	0.0272	0.0290	0.0544*
		(2.66)	(2.67)	(2.98)	(0.95)	(1.01)	(1.89)
Cvol		0.0732	0.0815	-0.0019	-0.1709	-0.1378	-0.2358
		(0.50)	(0.56)	(-0.01)	(-0.62)	(-0.50)	(-0.92)
Pvol		-0.2368*	-0.2345*	-0.1365	0.0267	0.0270	0.0507
		(-1.92)	(-1.90)	(-1.08)	(0.10)	(0.10)	(0.19)
Iskew		-0.0210	-0.0211	-0.0161	-0.0173	-0.0153	-0.0205
		(-1.54)	(-1.55)	(-1.31)	(-0.95)	(-0.85)	(-1.13)
Adj. *R*-squared	0.00	0.10	0.10	0.09	0.16	0.16	0.14
No. cross-section	1,924	956	956	956	372	372	372

影响机制

- Atmaz and Basak (2018)说明了即使没有卖空限制，分歧也可能与未来回报呈负相关。
- Hong and Sraer (2016)认为高beta的股票有更大的投资者分歧，由于隐形的卖空限制，更容易被高估。
- 通过盈利意外 (earning surprise, SUE) 的高低来定义积极和消极的现金流新闻。

$$SUE_{i,q}^{SRW} = \frac{E_{i,q} - E_{i,q-4}}{P_{i,q}}$$

其中，$\alpha + \beta$ 是实际的季度每股盈利（earnings per share），对公司 i 和季度 q 。$E_{i,q-4}$去年同季度的每股盈利。 $P_{i,q}$是财报发布（earnings announcement）前20天的股价。 SRW是季节性随机游走（seasonal random walk）

- 基于分析师预测来定义盈利意外，每股实际盈利减去平均的分析师预测

$$SUE_{i,q}^{Analyst} = \frac{E_{i,q} - E_{i,q}^{Analyst}}{P_{i,q}}$$

累计异象收益，因变量

收益公告日后的累积异象收益 (CAR) 定义为股票的已实现累积收益率与其预期累积收益率之间的差异，其中预期收益率使用资本资产定价模型 (CAPM) 来估计。

$$
\begin{aligned}
CAR\left[1,5\right]_{i,t} &= \alpha^{High}\, High_{i,t} + \alpha^{Medium}\, Medium_{i,t} + \alpha^{Low}\, Low_{i,t} \\
&+ \beta^{Dis\times High}\, Disagreement_{i,t-1} \times High_{i,t} \\
&+ \beta^{Dis\times Medium}\, Disagreement_{i,t-1} \times Medium_{i,t} \\
&+ \beta^{Dis\times Low}\, Disagreement_{i,t-1} \times Low_{i,t} + Controls_{i,t} + \varepsilon_{i,t}
\end{aligned}
$$

其中CAR为收益公告日后第1至5天的累计超额收益；disagreement是在收益公告前10天的分歧；High, Medium, Low是虚拟变量，分别指示SUE排在前20%，中间40%，最后20%。如果排名不是这两个的合集，那就去除这些样本。由于波动率策略交易在财报发布前后比较普遍，在估计分歧时，去除平值期权。 cumulative abnormal returns是财报发布后五天的累计超额收益。

现金流分类回归

Table 6
Earnings surprises: Main panel regressions

A. Baseline results

	Cumulative abnormal returns [1,5]			
	All stocks (1)	Low-beta stocks (2)	Medium-beta stocks (3)	High-beta stocks (4)
High	0.010***	0.010***	0.009***	0.011***
	(4.94)	(2.79)	(3.28)	(3.98)
Medium	0.000	0.001	0.000	−0.003
	(−0.18)	(0.86)	(0.08)	(−1.55)
Low	−0.009***	−0.012***	−0.007**	−0.008***
	(−5.10)	(−4.74)	(−2.23)	(−3.74)
Disagreement x High	−0.017***	−0.013	−0.013*	−0.020**
	(−2.68)	(−1.19)	(−1.90)	(−1.98)
Disagreement x Medium	0.001	−0.002	0.003	0.003
	(0.30)	(−0.85)	(0.75)	(0.58)
Disagreement x Low	0.019***	0.024***	0.011	0.019**
	(3.44)	(3.18)	(1.19)	(2.30)
Fixed effects	Quarter	Quarter	Quarter	Quarter
Clustered errors	Firm/time	Firm/time	Firm/time	Firm/time
Adj. *R*-squared	.010	.014	.012	.015
N	80,330	26,665	26,765	26,900

现金流分类回归

Table 6
Continued

B. Additional control variables

	Cumulative abnormal returns [1,5]			
	All stocks	Low-beta stocks	Medium-beta stocks	High-beta stocks
	(1)	(2)	(3)	(4)
High	0.0095***	0.0105***	0.0095***	0.0089***
	(5.92)	(3.03)	(3.77)	(3.79)
Medium	−0.0002	0.0005	−0.0007	−0.0013
	(−0.25)	(0.60)	(−0.64)	(−0.75)
Low	−0.0076***	−0.0098***	−0.0076**	−0.0065**
	(−4.17)	(−3.56)	(−2.32)	(−2.35)
Disagreement x High	−0.0175***	−0.0153	−0.0145**	−0.0181*
	(−3.20)	(−1.39)	(−2.21)	(−1.91)
Disagreement x Medium	0.003	−0.0013	0.0062**	0.0049
	(1.45)	(−0.48)	(2.34)	(0.86)
Disagreement x Low	0.0127**	0.0187**	0.0124	0.0086
	(2.16)	(2.15)	(1.24)	(0.94)

现金流分类回归

Directional	−0.0001	−0.001	0.0001	0.001
	(−0.13)	(−1.14)	(0.15)	(0.85)
ESS	−0.019	−0.0001	−0.0409	−0.0167
	(−1.35)	(−0.01)	(−1.56)	(−0.44)
ESO	0.0026	−0.0011	0.0022	0.0056
	(0.50)	(−0.16)	(0.33)	(0.56)
log(Size)	−0.0001	0.0001	−0.0004	−0.0004
	(−0.37)	(0.18)	(−0.96)	(−0.82)
log(BM)	0.0018*	0.0017	0.0022*	0.0015
	(1.75)	(1.11)	(1.65)	(1.28)
IdiosyncVol	0.0333	0.0082	−0.0186	0.073***
	(1.62)	(0.36)	(−0.59)	(3.33)
SOI	0.0013	−0.0005	−0.0052	0.0087
	(0.27)	(−0.07)	(−0.80)	(0.87)
StockTurn	0.0381	0.0089	0.0744	0.0597
	(0.83)	(0.10)	(1.27)	(1.03)
PIN	−0.0102**	0.0034	−0.0234***	−0.0047
	(−2.07)	(0.51)	(−3.81)	(−0.43)
Fixed effects	Quarter	Quarter	Quarter	Quarter
Clustered errors	Firm/time	Firm/time	Firm/time	Firm/time
Adj. *R*-squared	.010	.014	.016	.014
N	73,493	24,431	24,743	24,319

Nagel(2005

Table 7
Earnings surprises: Additional results

A. High-beta stocks

	Cumulative abnormal returns [1,5]		
	Low InstOwner	Medium InstOwner	High InstOwner
	(1)	(2)	(3)
High	0.017***	0.006*	0.005
	(3.86)	(1.80)	(1.11)
Medium	−0.002	−0.004	0.001
	(−0.51)	(−1.60)	(0.25)
Low	−0.003	−0.006	−0.012**
	(−0.86)	(−1.28)	(−2.00)
Disagreement x High	−0.031***	−0.011	−0.011
	(−2.57)	(−0.67)	(−0.79)
Disagreement x Medium	0.013	0.003	0.003
	(1.28)	(0.34)	(0.31)
Disagreement x Low	0.016	0.012	0.008
	(0.95)	(0.89)	(0.45)
Additional controls	Yes	Yes	Yes
Fixed effects	Quarter	Quarter	Quarter
Clustered errors	Firm/time	Firm/time	Firm/time
Adj. R-squared	.023	.032	.021
N	7,699	7,446	7,985

Nagel(2005)表面机构持有量低时，只能融券很少的股份，增加了卖空限制

B. Low-beta stocks

	Cumulative abnormal returns [1,5]		
	Low InstOwner	Medium InstOwner	High InstOwner
	(1)	(2)	(3)
High	0.015***	0.008	0.004
	(2.79)	(1.60)	(0.90)
Medium	−0.003*	0.001	0.004*
	(−1.78)	(0.67)	(1.67)
Low	−0.010**	−0.003	−0.013**
	(−2.39)	(−0.54)	(−2.24)
Disagreement x High	−0.032*	−0.005	0.006
	(−1.70)	(−0.29)	(0.41)
Disagreement x Medium	0.007	0.001	−0.015**
	(1.23)	(0.19)	(−1.97)
Disagreement x Low	0.030*	−0.027*	0.041***
	(1.74)	(−1.85)	(2.29)
Additional controls	Yes	Yes	Yes
Fixed effects	Quarter	Quarter	Quarter
Clustered errors	Firm/time	Firm/time	Firm/time
Adj. *R*-squared	.023	.019	.030
N	8,225	7,990	7,377

稳健性检验

remark.js 与 xaringan 的区别

remark.js （左）与 xaringan （右）：

1. 需要一个 HTML 容器文件；
2. 只能用 Markdown；
3. 若想自动播放幻灯片需要写 JavaScript；
4. 需手工配置 MathJax；
5. 用 * 高亮一行代码；
6. 编辑 Markdown 之后需要刷新浏览器看结果；

1. 用 R Markdown 文档生成幻灯片；
2. Markdown 里可以嵌入 R 代码；
3. 可用 autoplay 选项自动播放；
4. MathJax 无需特别配置；*
5. 用 {{}} 高亮一行代码;
6. 用 RStudio 插件“Infinite Moon Reader”自动预览幻灯片；

[*] 下一页有数学公式例子。

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谢谢

本幻灯片发布于 GitHub