Disagreement in the Equity Options Market and Stock Returns

Benjamin Golez and Garrick Aden-Buie

汇报人：陈伟涛

2023-11-01

结论

- 投资者分歧和预期股票收益率负相关
- 盈利与预期偏差影响二者相关性
- 二者相关性在高贝塔、难以卖空的股票中更明显

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
A. All stocks						
Disagreement	0.33	0.32	0.00	1.00	0.24	326099
Directional	-0.03	-0.03	-1.00	1.00	0.49	326099
AnalystDis	0.02	0.00	0.00	37.82	0.25	283460
StockTurn	0.26	0.19	0.00	230.75	0.50	326097
MFDis	0.01	0.01	0.00	0.13	0.00	314767
B. 500 largest stocks						
Disagreement	0.48	0.50	0.00	1.00	0.21	79174
Directional	-0.07	-0.07	-1.00	1.00	0.34	79174
AnalystDis	0.00	0.00	0.00	0.60	0.01	77346
StockTurn	0.22	0.17	0.01	8.76	0.19	79174
MFDis	0.01	0.01	0.00	0.07	0.00	78135

相关系数

表2 相关系数表

	Disagreement	Directional	AnalystDis	StockTurn	MFDis
A. All stocks					
Disagreement	1.00	0.01	-0.01	0.14	0.17
Directional	0.01	1.00	0.02	0.01	-0.05
AnalystDis	-0.01	0.02	1.00	0.02	-0.04
StockTurn	0.14	0.01	0.02	1.00	-0.05
MFDis	0.17	-0.05	-0.04	-0.05	0.49
log(Size)	0.37	-0.10	-0.09	-0.05	0.49
B. 500 largest stocks					
Disagreement	1.00	0.15	0.05	0.22	0.19
Directional	0.15	1.00	0.02	0.06	0.02
AnalystDis	0.05	0.02	1.00	0.17	-0.04
StockTurn	0.22	0.06	0.17	1.00	-0.11
MFDis	0.19	0.02	-0.04	-0.11	1.00
log(Size)	0.37	0.01	-0.13	-0.30	0.44

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)认为盈利偏差影响分歧和预期收益率的关系
- 基于季节性随机游走的盈利意外定义（Earnings Surprise, SUE）：

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

其中，i 是某个公司；q 是某个季度；$E_{i,q}$ 是当季度每股盈利；$E_{i,q-4}$ 是去年同季度的每股盈利；$P_{i,q}$是财报发布前20天的股价；SRW是季节性随机游走（Seasonal Random Walk)

- 基于分析师预测（$Analyst$）来定义盈利意外：

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

其中，$E_{i,q}^{Analyst}$ 是分析师盈利预测平均值，其余定义不变

影响机制

- Hong and Sraer (2016)认为负向效应在高beta的股票中更为显著
- 回归方程如下：

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

- CAR（Cumulative Abnormal Returns）为财报发布日后第1至5天的累计超额收益（相对于市场风险）
- Disagreement为财报发布日前10天的平均分歧（不包括平值期权）
- High、Medium和Low为虚拟变量，分别表示两个指标SUE前20%、中间40%和最后20%的交集

按beta分类的回归结果

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

按beta分类的回归结果

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)

按beta分类的回归结果

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)机构持有量理论

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)机构持有量理论

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

- 稳健性检验前（左）和稳健性检验后（右）：

1. 月平均成交量；
2. 成交量加权组合收益率；
3. 月度频率；
4. 用CAPM模型计算CAR；
5. 没有考虑另外的分歧差异；

1. 持仓量（相关系数0.77）；
2. 平均加权组合收益率；
3. 周度频率；
4. 用五因子模型计算CAR；
5. 增加控制变量，即期权交易量在不同在值程度上的离散程度；

参考文献

1. Atmaz, A., & Basak, S. Belief dispersion in the stock market. *Journal of Finance*, 2018, 73(3): 1225–1279.

2. Golez, B., & Goyenko, R. Disagreement in the equity options market and stock returns. *The Review of Financial Studies*, 2022, 35(3): 1443–1479.

3. Hong, H., & Sraer. D. A. Speculative betas. *Journal of Finance*, 2016, 71(5): 2095–2144.

4. Nagel, S. Short sales, institutional investors and the cross-section of stock returns. *Journal of Financial*, 2005, 78(2): 277–309.

谢谢

本幻灯片发布于 GitHub