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Innovation and Informed Trading: Evidence from Industry ETFs

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The rise of ETFs…

- Few recent financial innovations have had the impact of ETFs
  - More than 5,000 exchange-traded products, assets now exceeding those of hedge funds, etc.
- This "disruptive innovation" has had far reaching effects
  - A more liquid, lower-cost alternative to mutual funds
  - A vehicle to access unavailable asset classes
- In this paper we investigate another role – the expanded ability to hedge

Industry ETFs

- We focus on the role of industry ETFs and how this innovation affects informed trading and the efficiency of the market.
  - Innovations that facilitate risk-sharing can facilitate arbitrage trading (Allen and Gale [1994]; Dow [1998]; Simsek [2013])
  - While futures or index ETFs can be used to hedge market risk, industry ETFs can better hedge industry risk

Two initial facts

- Industry ETF are more likely to have large short interest than either non-industry ETFs or individual stocks

- Short interest on industry ETFs is not necessarily indicative of bad news.

"long the stock /short the ETF"

- If informed traders use this strategy to profit from positive news, the short leg is the short sale of the industry ETF.
  - A feasible strategy because Industry ETFs have relatively low shorting costs
- Hedge funds likely candidates to adopt this strategy, so we look at hedge fund holdings to capture the long leg of the strategy

General approach

- Construct a long-short activity measure that captures simultaneous spikes in abnormal hedge fund holdings on an underlying stock and abnormal short interest in the stock's parent industry ETF
- Focus on long-short activity prior to earnings announcements, on PEAD, and on how the inception of ETFs affects arbitrage risk.

Main results

- We find that industry ETFs facilitate informed trading
  - Long-short activity surges before positive earnings announcements; effects are stronger for stocks with high industry exposure
  - Large ETF short interest predicts positive earnings surprises among underlying stocks
- We find that Industry ETFs improve market efficiency
- We show important asset pricing effects
  - changes in ΔSIR positively predict ETF returns and %ΔNAV

A vast literature(s)

- Financial innovation — Chen (1995); Duffie and Rahi (1995); Cong and Xu (2016); Madhavan (2016); Bhattacharya and O'Hara (2017)
- Empirical ETFs — Ben-David et al (2014); Madhavan and Sobczyk (2015);Wermers and Xue (2015); Glosten et al (2017); Israeli et al (2017); Easley, et al (2018)
- Short-selling — Boehmer et al (2008); Diether et al (2009); Battalio and Shultz (2011);; Comerton-Forde, et al (2016); Li and Zhu [2018]; Hwang et al (2019); Karmaziene and Sokolovski (2019).

Hypotheses

Hypothesis 1

- *If informed investors use a "long-the-stock/short-the-ETF" strategy, then there are simultaneous spikes in hedge funds' long positions on the stock and short interest in the stock's parent ETF before the stock announces a positive SUE.*

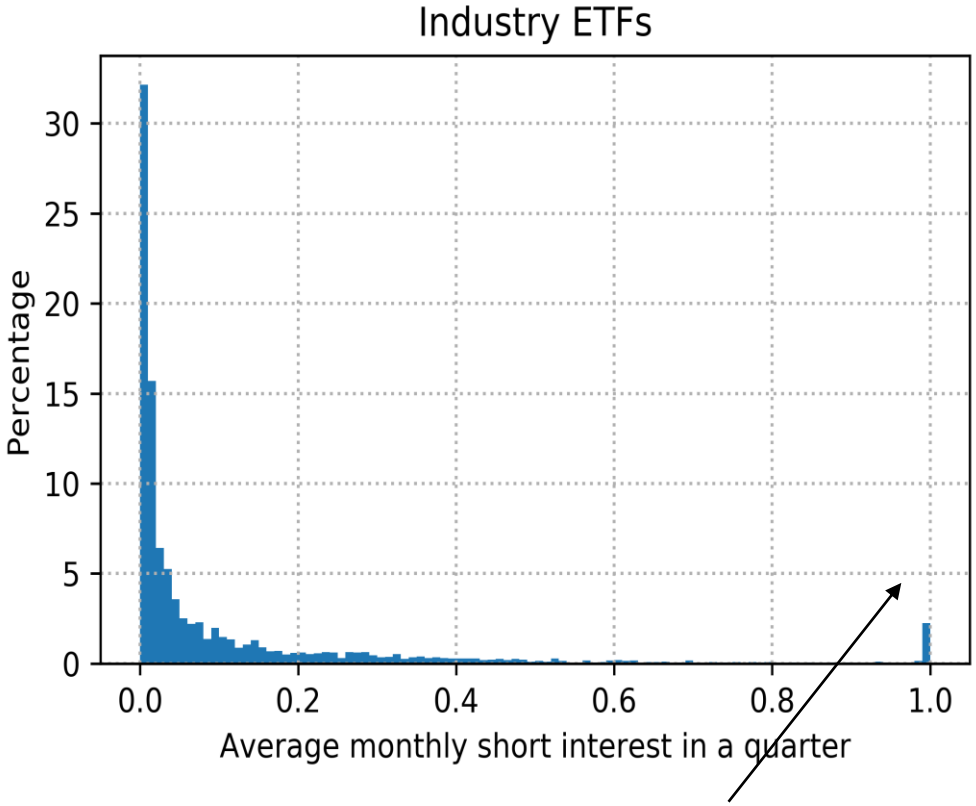
Hypothesis 1.a

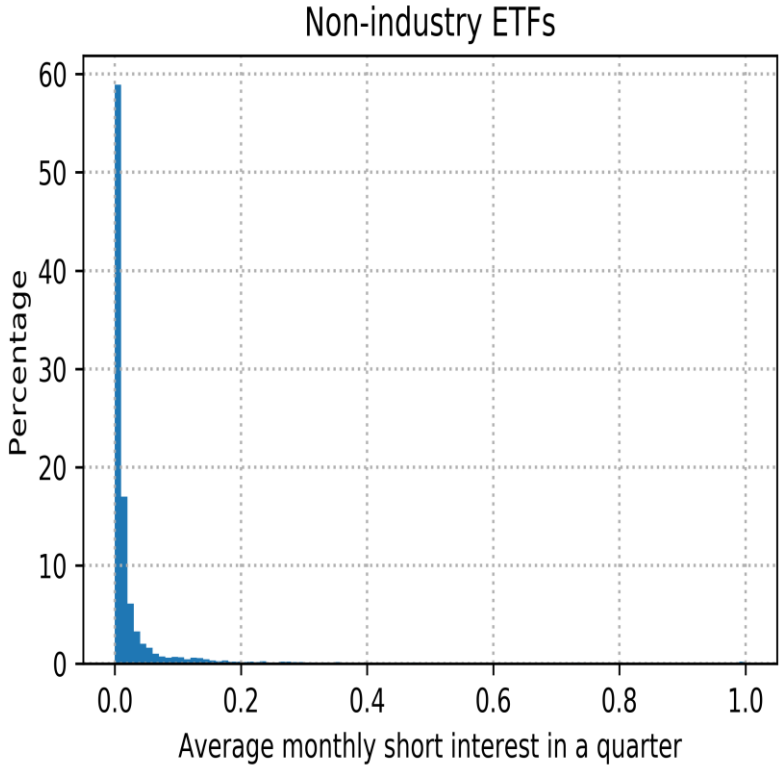
- *The relation between long-short activity and positive SUE is more pronounced among stocks with high industry risk exposure.*

Hypothesis 2

- *If the industry ETF helps investors better trade on firm-specific information, then we expect the industry ETF to reduce PEAD for its constituent stocks.*

Industry vs. non-industry ETFs





Short interest > 100% shares outstanding

Long-short and earnings announcements

- For each stock-ETF pair, we define a dummy variable to be 1 if both abnormal hedge fund holdings of the stock and abnormal SIR of the ETF are above 80% percentile of the sample.
- We ran

$$Dummy\_LS_{i,s,t} = \beta_1 Dummy\_Pos\_SUE_{s,t} + Controls + Year\ FE + Quarter\ FE + ETF\ FE + Industry\ FE + \epsilon_{i,s,t},$$

Long-short and earnings announcements

Dummy =1 if the stock's standardized unexpected earnings are in the top 25% of earnings announcement sample

- We ran

$$Dummy\_LS_{i,s,t} = \beta_1 Dummy\_Pos\_SUE_{s,t} + Controls + Year\ FE + Quarter\ FE + ETF\ FE + Industry\ FE + \epsilon_{i,s,t},$$

Long-short before good news?

Panel A: Full sample

DepVar:	*Dummy_LS* based on Hedge Funds Holdings		*Dummy_LS* based on Non-Hedge Funds Holdings
	[1]	[2]	[3]
Dummy_Pos_SUE	0.009***	0.007***	0.002
	(5.79)	(4.97)	(1.16)
Size		-0.007***	-0.007***
		(-6.90)	(-6.63)
BM		0.002	-0.004**
		(1.52)	(-2.62)
IO		0.048***	0.055***
		(8.27)	(7.01)
Reversal		0.001	0.011
		(0.09)	(0.86)
Momentum		0.007**	0.031***
		(2.20)	(3.41)
EarnVola		0.000	0.000
		(1.16)	(0.81)
EarnPers		-0.000	0.001
		(-0.21)	(0.42)
Year FE	Yes	Yes	Yes
Qtr FE	Yes	Yes	Yes
ETF FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
No. Obs.	379,167	361,813	361,813
Adj-R^2	0.0310	0.0357	0.0678

But maybe not always..

Panel B: Crisis vs. non-crisis period

DepVar: Dummy_LS	*Non-Crisis Period*	*Crisis Period*
	[1]	[2]
Dummy_Pos_SUE	0.007***	0.002
	(4.58)	(1.40)
Size	-0.007***	-0.009**
	(-6.95)	(-2.95)
BM	0.003**	-0.000
	(2.25)	(-0.04)
IO	0.045***	0.053**
	(8.62)	(2.76)
Reversal	0.008	-0.021
	(1.01)	(-1.16)
Momentum	0.005**	0.003
	(2.00)	(0.38)
EarnVola	0.000	-0.000***
	(0.13)	(-3.91)
EarnPers	-0.001	0.005
	(-1.16)	(0.86)

Is the effect stronger for stocks with greater industry exposure?

DepVar: Dummy_LS	Industry Risk Exposure Subsample			
	Low	High	Low	High
	[1]	[2]	[3]	[4]
Dummy_Pos_SUE	0.007***	0.012***	0.004***	0.010***
	(4.72)	(3.80)	(3.37)	(2.75)
Size			-0.007***	-0.008***
			(-6.19)	(-6.28)
BM			-0.001	0.005

Does industry ETF membership reduce PEAD?

Use a propensity matching score/ matched sample approach to control for membership differences

- We ran

$$CAR(1,k)_{s,t} = \beta_1 SUE_{Rank_{s,t}} + \beta_2 Dummy_{Member_{s,t}} + \beta_3 SUE_{Rank_{s,t}} \times Dummy_{Member_{s,t}} + Controls + Year\ FE + Quarter\ FE + Industry\ FE + \epsilon_{s,t},$$

Panel B: Regression in the matched sample

DepVar:	*CAR*(1,30)		*CAR*(1,60)	
	[1]	[2]	[3]	[4]
SUE_Rank	0.007***	0.007***	0.011***	0.012***
	(12.73)	(12.70)	(14.03)	(14.11)
Dummy_Member	-0.002*	0.001	-0.013***	-0.005**
	(-1.79)	(0.79)	(-7.70)	(-2.35)
SUE_Rank × Dummy_Member	-0.004***	-0.004***	-0.007***	-0.007***
	(-6.09)	(-5.86)	(-7.26)	(-7.12)
Size		-0.008***		-0.012***
		(-10.64)		(-11.00)
BM		-0.003*		-0.002
		(-1.89)		(-1.01)
IO		0.019***		0.022***
		(8.77)		(6.85)
# Analysts		0.001***		0.000
		(2.71)		(0.27)
IVOL		-0.196***		-0.466***
		(-2.60)		(-4.34)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Qtr FE	Yes	Yes	Yes	Yes
No. Obs.	119,832	118,661	119,832	118,661
Adj-R^2	0.0047	0.0072	0.0055	0.0084

Is this effect due to the ETF?

- A *diff-in-diff approach* to look at L-S activity around earnings announcements in the two year window around ETF inception
  - Assign member stocks into treatment (high industry exposure) and control groups (lower industry exposure). We create a pseudo-ETF to capture before period
  - Control and target groups have similar PEAD reaction in the year before ETF inception but very different after – big reductions in High PEAD

Arbitrage risk

- Arbitrage risk measures the extent a stock' return variation can be hedged by substitute stocks. (seeWurgler and Zhuravskaya (2002)
  - For each stock, pick three closest substitutes
  - Conduct diff-in-diff on residual variance before and after ETF inception

  Result – Inception of IETF leads to a meaningful reduction in arbitrage risk, and it greater for pair stocks with higher shorting costs.

Predicable returns and IETF short interest

- We have shown that:
  - Industry ETFs have greater extreme short interest than other ETFs
  - This larger short interest is due to hedging (non-crisis)
    - "long the stock/short the ETF" strategy
- One asset pricing implication:

  Extreme short interest should create a temporary price impact in the IETF — leading to predictable IETF returns

- We construct a long-short portfolio based on 3 IETF monthly ΔSIR portfolios
  - We long the ETF in highest one and short the ETF in the lowest one.

- Applying a similar approach to stocks results in a negative 40 basis pt return

Short interest and future returns

Panel A.1: Performance of Industry ETF portfolios sorted by *ΔSIR*, based on ETF returns

	Excess Returns		CAPM alpha		FF3 alpha		FFC4 alpha	
	[1]		[2]		[3]		[4]	
	Estimate	*T*-stat.	Estimate	*T*-stat.	Estimate	*T*-stat.	Estimate	*T*-stat.
Bottom 30%	1.11	3.02	-0.31	-4.63	-0.25	-4.31	-0.23	-4.19
Mid 40%	1.30	3.71	-0.09	-1.19	-0.04	-0.60	-0.03	-0.43
Top 30%	1.37	3.78	-0.05	-0.54	0.00	0.02	0.02	0.17
Top - Bottom	**0.26**	**2.81**	**0.26**	**2.77**	**0.25**	**2.69**	**0.25**	**2.59**

Panel A.2: Performance of Industry ETF portfolios sorted by *ΔSIR*, based on ETF *NAV* change

	Excess Returns		CAPM alpha		FF3 alpha		FFC4 alpha	
	[1]		[2]		[3]		[4]	
	Estimate	*T*-stat.	Estimate	*T*-stat.	Estimate	*T*-stat.	Estimate	*T*-stat.
Bottom 30%	0.96	2.56	-0.47	-5.50	-0.42	-5.36	-0.40	-5.40
Mid 40%	1.10	3.08	-0.30	-2.85	-0.26	-2.64	-0.24	-2.60
Top 30%	1.24	3.41	-0.18	-1.78	-0.13	-1.37	-0.12	-1.25
Top - Bottom	**0.28**	**2.84**	**0.29**	**2.96**	**0.28**	**2.89**	**0.28**	**2.81**

Improving return predictability

- Is return predictability higher if hedge fund holdings increase contemporaneously with the increase in short selling?
  - Define $PosAHF_{i,t}$ to be the number of underlying stocks with positive abnormal hedge funds holdings at month t divided by the total number of members in ETF i.

Conditional results

		ETF return (%)			
		High *PosAHF*		Low *PosAHF*	
	Portfolios by *ΔSIR*	coef.	*t*-stat.	coef.	*t*-stat.
Excess Returns	Low	0.84	1.86	1.32	4.05
	High	1.35	3.13	1.32	4.02
	High - Low	0.51	2.75	0.00	-0.02
CAPM Alpha	Low	-0.74	-3.87	0.10	0.80
	High	-0.20	-0.91	0.05	0.40
	High - Low	0.54	2.58	-0.05	-0.37
FF3 Alpha	Low	-0.67	-3.89	0.15	1.21
	High	-0.13	-0.62	0.09	0.78
	High - Low	0.54	2.52	-0.06	-0.45
FFC4 Alpha	Low	-0.62	-3.53	0.15	1.17
	High	-0.10	-0.50	0.09	0.77
	High - Low	0.52	2.34	-0.06	-0.44

Portfolios sorted by ΔSIR and a measure of hedge fund abnormal holdings in the stock

Fama - MacBeth Regressions

Panel B: Fama-MacBeth regressions

	DepVar: Ret_{t+1}				*DepVar*: ΔNAV_{t+1}			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ΔSIR_t	0.030***		-0.091*	-0.07	0.034***		-0.062	-0.048
	(2.78)		(-1.80)	(-1.49)	(3.14)		(-1.39)	(-1.37)
$PosAHF_t$		-0.002	0.000	0.003		0.001	0.002	0.003
		(-0.21)	(-0.05)	(0.44)		(0.05)	(0.21)	(0.54)
$\Delta SIR_t \times PosAHF_t$			0.456**	0.311**			0.357**	0.254**
			(2.44)	(2.08)			(2.13)	(2.02)
Intercept	0.013***	0.015***	0.014***	0.017	0.012***	0.013***	0.012***	0.017
	(3.72)	(4.94)	(4.65)	(1.38)	(3.52)	(4.34)	(4.09)	(1.44)
Controls	No	No	No	Yes	No	No	No	Yes

Stock level predictability

DepVar:	$Ret_{s,t+1}$		
	[1]	[2]	[3]
$Dummy\_LS_{i,s,t}$	0.50***	0.45***	0.27**
	(3.22)	(3.60)	(2.40)
$Dummy\_LS_{i,s,t} \times Dummy\_HighExposure_{i,s,t}$			0.59**
			(2.13)
$Dummy\_HighExposure_{i,s,t}$			-0.08
			(-0.28)
Intercept	1.48***	1.57**	1.63**
	(3.57)	(1.98)	(2.12)
Controls	No	Yes	Yes

Stock level predictability

DepVar:	$Ret_{s,t+1}$		
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$Dummy\_LS_{i,s,t}$	0.50***	0.45***	0.27**
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$Dummy\_LS_{i,s,t} \times Dummy\_HighExposure_{i,s,t}$			0.59**
			(2.13)
$Dummy\_HighExposure_{i,s,t}$			-0.08
			(-0.28)
Intercept	1.48***	1.57**	1.63**
	(3.57)	(1.98)	(2.12)
Controls	No	Yes	Yes

Conclusions

- Industry ETFs appear to be a valuable innovation by facilitating the hedging of industry risk
  - Our paper provides strong evidence of industry ETFs enabling the "long the stock/short the industry ETF" strategy
    - Short interest in industry ETFs is a different animal than short interest in stocks and even other ETFs
    - It appears to be implemented by hedge funds
    - It makes the market more informationally efficient
    - It results in return predictability