"The Real Eects of Exchange Traded Funds"

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The Real Effects of Exchange Traded Funds

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SHoF conference on Financial Markets and Corporate Decisions

Motivation

- ETFs has been growing spectacularly in the recent decade.
  - 1,988 ETFs managing 3.4 trillion USD in the US market at the end of 2018 (Investment Company Institute 2019).
  - Globally, more than 5,000 ETFs manage 4.7 trillion USD
  - Around 10% of the market capitalization, 30% of trading volume and 20% of short interests of securities traded on US stock exchange is attributable to ETFs (Ben-David, Franzoni and Moussawi, 2018).

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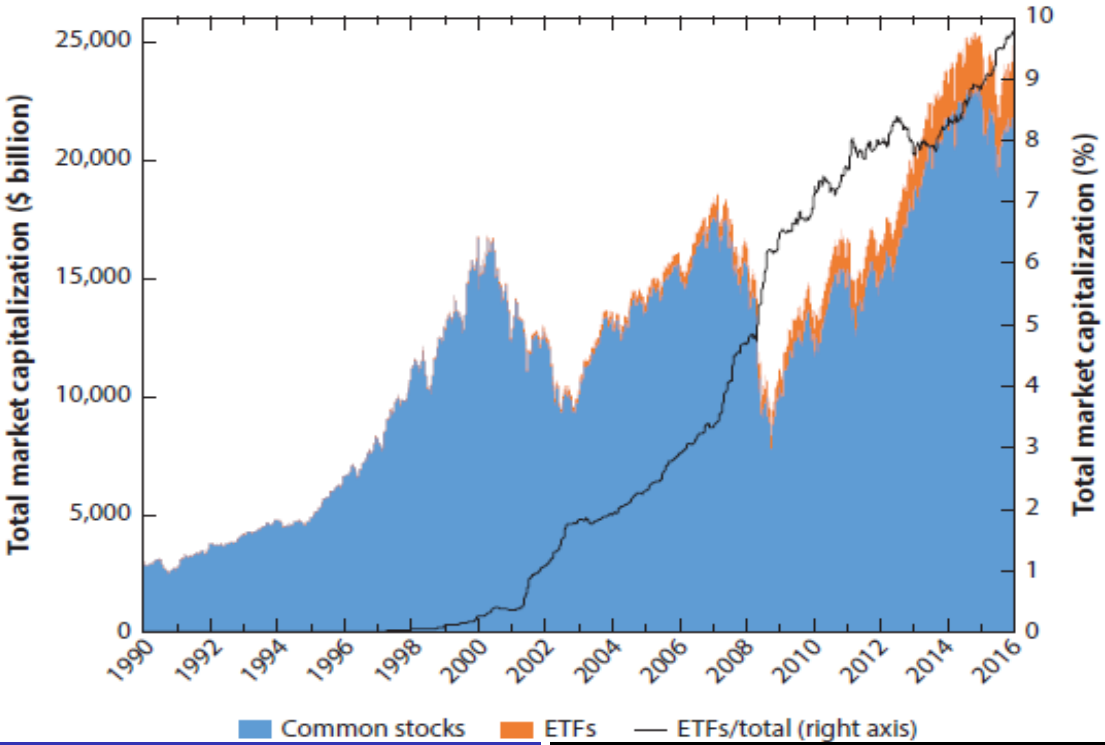

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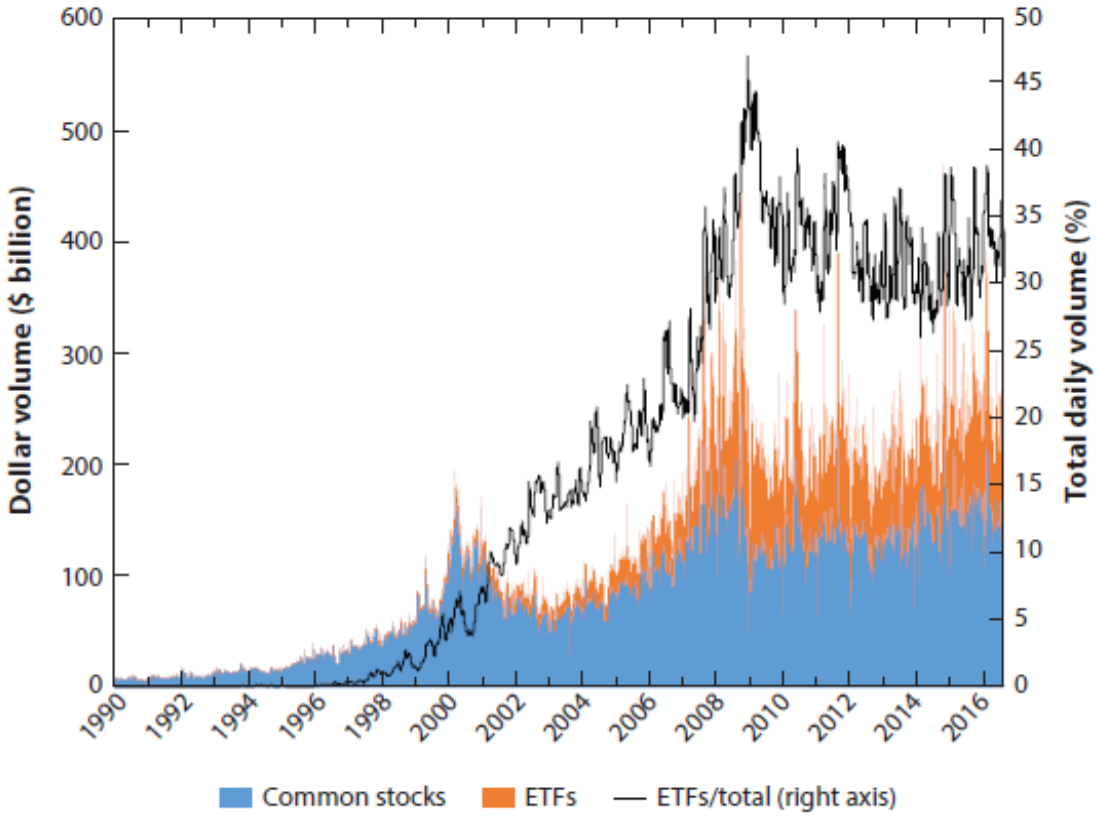

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- Rapid growth in ETFs has raised concerns among policy-makers and practitioners about their impact on financial markets (SEC commissioner Michael Piwowar, 2017)
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- Studies also examined the effects of ETFs on underlying securities' **informational efficiency** with mixed empirical findings:
  - (dark side) ETFs reduce *firm-specific information* of the underlying securities (Israeli et al., 2017)
  - (bright side) ETF activity facilitates the timely incorporation of *systematic information* into stock prices (Glosten et al., 2016; Bhojraj et al., 2018)

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- However,the net effect of ETFs on the informational efficiency of their constituents is still ambiguous.

What We Do

- **We investigate how ETFs affect the real investment efficiency of underlying stocks.**
  - Price efficiency should be evaluated as the extent to which prices reflect information useful for the efficiency of real decisions, rather than the extent to which they forecast future cash flows (Bond, Edmans and Goldstein, 2012).

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- Market participants are concerned about the impact of rising ETF ownership on the allocation role of asset prices.
- *A capitalist system in which investors invest passively in index funds is worse than a centrally planned economy where governments direct all investment* —Sanford C. Bernstein: Why Passive investing is worse than Marxism

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What We Find

- ETFs improve the sensitivity of real investment to Tobin's q.
  - One inter-quartile increase in ETF ownership increases investment-q sensitivity by about 7%.
  - Effect is plausibly causal using Russell index reconstitution and BlackRock's acquisition of iShares as exogenous shock to ETF ownership.

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- Consistent with the managerial learning channel, we find:
  - ETF ownership reduces investment sensitivity to peers' price.
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  - Effect stronger for firms whose managers have stronger incentive to learn systematic information from stock prices.
- Why the firm manager does not simply learn about the systematic information from the ETF prices?
- Learning constraints: managers can more effectively extract information from own firms' stock price than from the prices of dozens of ETFs holding the stock.

Data

- Our sample consists of all U.S. domestic equity ETFs (in CRSP mutual fund database) that physically replicate the indices:
  - Parse fund names to tease out non-equity or non-domestic ETFs.
  - Require holdings information available from Thomson Reuters S12.
  - Final sample consists of 605 ETFs from 2003 to 2016.
- Further restrict underlyings of ETFs to stocks traded on NYSE, AMEX and NASDAQ, and not in financial and utility industry.

Measuring ETF ownership

- We construct ETF ownership (ETF_{it}) for each stock i using following equation:

$$ETF_{it} = \frac{\sum_{j=1}^{J} SHARES_{ijt}}{TotalShareOutstanding_{it}} \quad (1)$$

  - $SHARES_{ijt}$ is the number of shares of stock i held by ETF j at the end of fiscal year t.
  - $TotalShareOutstanding_{it}$ is stock i's total shares outstanding at the end of fiscal year t.
- *Investment*: The sum of capital expenditure and R&D expense ($CAPXRND$), capital expenditure ($CAPX$) and R&D expense (RND). All scaled by begining-of-year total assets.
- Q: Market value of equity plus book value of asset minus book value of equity scaled by beginning-of-year total asset. The book value of equity is defined following the definition of Fama and French (1992).

Does ETF ownership Make Stock Prices More Informative?

- The premise of our hypothesis is that stock prices become more informative about systematic information as ETF ownership increases.
- To test, we examine the future earnings - return relation.
- Further decompose earnings into systematic and firm-specific components:

$$Earning_{it} = \alpha_t + \mu_i + \beta_1 RET_{it-1} + \beta_2 RET_{it-1} * ETF_{it-1} + \beta_3 ETF_{it-1} + \gamma X_{it-1} + \epsilon_{it}, \quad (2)$$

	Earn	Earn_Sys	Earn_Firm
$RET_{it-1} * ETF_{it-1}$	0.146**	0.205***	-0.162*
	(2.32)	(4.33)	(-1.87)
RET_{it-1}	0.006***	-0.004*	0.015***
	(2.63)	(-1.91)	(4.55)
ETF_{it-1}	0.338***	0.067	0.511***
	(3.24)	(1.15)	(4.23)
	(1.45)	(1.10)	(1.45)
Controls	Included	Included	Included
Adjusted R2	0.224	0.404	0.214
Fixed Effect	Y, F	Y, F	Y, F
N. of Obs.	30828	30828	30828

ETF Ownership and Investment-Price Sensitivity

	CAPXRND	CAPX	RND
$Q_{it-1} * ETF_{it-1}$	0.106***	0.033***	0.076***
	(4.50)	(2.99)	(4.24)
Q_{it-1}	0.033***	0.010***	0.022***
	(9.34)	(5.11)	(8.32)
ETF_{it-1}	-0.296***	-0.095***	-0.209***
	(-5.36)	(-2.85)	(-5.63)
Controls	Included	Included	Included
Adjusted R2	0.778	0.686	0.893
Fixed Effect	Y, F	Y, F	Y, F
N. of Obs.	30864	30864	30864

*Controls: (1) firm size and its interaction with Tobin's Q; (2) institutional ownership and its interaction with Tobin's Q; (3) cash flow and its interaction with ETF ownership; (4) annualized future 3-year stock return; (5) the reciprocal of total asset, book leverage, return on asset, cash holding and sales growth.

$$Investment_{it} = \alpha_t + \mu_i + \beta_1 Q_{it-1} + \beta_2 Q_{it-1} * ETF_{it-1} + \beta_3 ETF_{it-1} + \gamma X_{it-1} + \epsilon_{it}, \quad (3)$$

IV Models: Russell Index Reconstitution

- Exploit the discontinuous change of ETF ownership when firms at the bottom of Russell 1000 index are reshuffled to the top of Russell 2000 index.
  - The weights of the top stocks in the Russell 2000 are about 10 times larger than those of the bottom stocks in the Russell 1000 (Chang, Hong, and Liskovich 2015)
- We adopt the empirical specification in Appel, Gormley and Keim (2016), instrumenting ETF ownership using $Incl2000_{it}$, an indicator equal to one if firm i is in the Russell 2000 index in year t.
- The baseline model uses a bandwidth of 200 firms around the Russell 1000 cut-off and the sample period is 2003-2006. The 1st-stage regression models are:

$$\begin{aligned} ETF_{it} &= \alpha_t + \beta_1 Incl2000_{it} + \beta_2 Incl2000_{it} * Q_{it} + \beta_3 Q_{it} + \sum_{n=1}^{N} \phi_n Ln(Mktcap_{it})^n \\ &\quad + \delta Ln(Float_{it}) + \gamma X_{it} + \epsilon_{it}, \end{aligned} \tag{4}$$

$$\begin{aligned} ETF_{it} * Q_{it} &= \alpha_t + \beta_1 Incl2000_{it} + \beta_2 Incl2000_{it} * Q_{it} + \beta_3 Q_{it} + \sum_{n=1}^{N} \phi_n Ln(Mktcap_{it})^n \\ &\quad + \delta Ln(Float_{it}) + \gamma X_{it} + \epsilon_{it}, \end{aligned} \tag{5}$$

IV Models: Russell Index Reconstitution

- In 2nd-stage, we regress investment on the predicted ETF_{it} and predicted $Q_{it} * ETF_{it}$ from 1st-stage:
  $Investment_{it} = \alpha_t + \mu_i + \beta_1 Q_{it-1} \times \widehat{ETF}_{it-1} + \beta_2 \widehat{ETF}_{it-1} + \beta_3 Q_{it-1} + \sum_{n=1}^{N} \phi_n (Ln(Mktcap_{it-1}))^n + \delta Ln(Float_{it-1}) + \gamma X_{it-1} + \varepsilon_{it}$
- Our result is robust to alternative bandwidths of 150, 250, and 300 firms around the Russell 1000 cut-off

	First-Stage		Second -Stage		
	ETF	**Q * ETF**	**CAPXRND**	**CAPX**	**R&D**
	(1)	(2)	(1)	(2)	(3)
Incl2000	0.0035**	-0.0036			
	(2.16)	(-0.68)			
*Incl2000*Q*	0.0002	0.0067**			
	(0.29)	(1.98)			
*Q * ETF(fitted)*			2.226***	1.237**	0.988***
			(3.24)	(1.97)	(4.03)
ETF(fitted)			-2.485	-3.087	0.602
			(-1.11)	(-1.52)	(0.58)
Controls	Included	Included	Included	Included	Included
F Test	20.30	53.50			
Adjusted R2	0.681	0.810	0.915	0.903	0.845
Fixed Effect	Y	Y	Y, F	Y, F	Y, F
N. of Obs.	547	547	221	353	353

IV Models: Purchases of iShares by BlackRock

- Barclays sold its iShares ETF unit to BlackRock at 2009 to avoid a potential bailout by U.K. government
- Because BlackRock has a stronger brand name, more specialized workforce and better distribution channels, AUM for iShares increased by 19% one year after the acquisition
  - Stocks with higher iShares ownership before the acquisition experienced an exogeneous increase in ETF ownership relative to stocks with low iShares ownership
- Our second instrument for ETF ownership is $Post_t * Treat_i$, where $Post_t$ is a dummy indicating post-2009 period, and $Treat_i$ is a dummy flags whether a company is in the top 30% of iShares ownership before the acquisition
- We restrict the sample period to be 3 years before and after the acquisition of iShares by BlackRock

IV Models: Purchases of iShares ETF by BlackRock

	First-Stage		Second -Stage		
	ETF	**Q * ETF**	**CAPXRND**	**CAPX**	**R&D**
	(1)	(2)	(3)	(4)	(5)
*Post * Treat*	0.0061***	-0.0277***			
	(6.61)	(-7.76)			
*Q * Post * Treat*	0.0004	0.0226***			
	(1.06)	(9.90)			
*Q * ETF (fitted)*			0.220***	0.100**	0.114**
			(2.72)	(2.20)	(2.09)
ETF(fitted)			-0.373	-0.226	-0.062
			(-1.23)	(-1.05)	(-0.36)
Q	0.0011	-0.0091	0.033***	0.009***	0.019***
	(1.01)	(-1.56)	(6.18)	(3.10)	(5.51)
Controls	Included	Included	Included	Included	Included
F Test	255.21	166.55			
Adjusted R2	0.894	0.910	0.832	0.747	0.936
Fixed Effect	Y, F	Y, F	Y, F	Y, F	Y, F
N. of Obs.	11936	11936	11537	11537	11537

- Our result is robust if we use top 20%, 40%, and 50% of iShare ownership before the acquisition to determine the treatment group

Why do Managers Rely on Own Stock Prices?

- Learning from ETF prices is cognitively challenging, as the manager needs to extract the systematic information from multiple ETF prices
- The learning constraints channel implies that when correlations between stock return and returns of holding ETFs are low, learning from ETF prices is more challenging, and managers learn more from own price

	CAPXRND	*CAPX*	*RND*
$Q_{it-1} * ETF_{it-1}$	0.206***	0.094***	0.110***
	(4.29)	(3.51)	(3.25)
$Q_{it-1} * ETF_{it-1} * Correlation_{it-1}$	-0.279***	-0.162***	-0.097
	(-3.02)	(-3.13)	(-1.43)
$ETFRET_{it-1} * Correlation_{it-1}$	0.019**	0.012**	0.008
	(2.03)	(2.00)	(1.40)
Q_{it-1}	0.036***	0.011***	0.022***
	(8.37)	(4.73)	(7.54)
ETF_{it-1}	-0.519***	-0.257***	-0.257***
	(-4.94)	(-3.90)	(-3.74)
$Correlation_{it-1}$	-0.033***	-0.019***	-0.009
	(-3.21)	(-2.88)	(-1.43)
$ETFRET_{it-1}$	-0.010*	-0.005	-0.005
	(-1.86)	(-1.45)	(-1.49)
Other Controls	Included	Included	Included
Adjusted R2	0.791	0.712	0.903
Fixed Effect	Y, F	Y, F	Y, F
N. of Obs.	26661	26661	26661

*$Correlation_{it-1}$ is the average correlation between stock return and returns of each holding ETF using past 9 months of daily return.

ETFs and investment sensitivity to peers' stock prices

- As ETFs facilitate incorporating systematic information into stock price, managers learn less from peers' prices (Foucault and Fresard, 2014).
- The interaction between peers' average Tobin's q and firm's ETF ownership $PQ_{it-1} \times ETF_{it-1}$ should be negative

	CAPXRND	CAPX	RND
$Q_{it-1} * ETF_{it-1}$	0.127***	0.043***	0.089***
	(5.00)	(3.48)	(4.73)
$PQ_{it-1} * ETF_{it-1}$	-0.069**	-0.035**	-0.040**
	(-2.37)	(-2.23)	(-2.18)
Q_{it-1}	0.035***	0.009***	0.024***
	(9.26)	(4.70)	(8.55)
PQ_{it-1}	0.002	0.003***	-0.000
	(1.34)	(2.80)	(-0.20)
ETF_{it-1}	-0.180**	-0.035	-0.146***
	(-2.50)	(-0.84)	(-3.28)
Controls	Included	Included	Included
Adjusted R2	0.779	0.692	0.893
Fixed Effect	Y, F	Y, F	Y, F
N. of Obs.	28119	28119	28119

*Peer firms are identified based on Text-based Network Industry Classification (TNIC) following Hoberg and Phillips (2010).

Cross-Sectional Heterogeneity

- Our learning hypothesis predicts ETFs should have a greater effect on investment-price sensitivity for firms whose managers have greater incentive to learn systematic information.
- **Market beta** proxy for importance of systematic information, **industry sales growth volatility** proxy for uncertainty of systematic shocks, **insider trading profitability** proxy for the precision of managerial private (firm-specific) information.

	Beta	*Sales Growth Volatility*	*Insider trading profit*
$Q_{it-1} * ETF_{it-1} * Dum_{it-1}$	0.104***	0.146**	0.066*
	(3.90)	(2.21)	(1.82)
$Q_{it-1} * ETF_{it-1}$	0.070***	0.090***	0.081***
	(3.04)	(3.83)	(3.45)
$Q_{it-1} * Dum_{it-1}$	-0.002	0.010***	-0.003
	(-1.40)	(2.72)	(-1.50)
$ETF_{it-1} * Dum_{it-1}$	-0.161***	-0.386***	-0.102
	(-3.25)	(-3.02)	(-1.62)
Q_{it-1}	0.035***	0.032***	0.035***
	(9.35)	(8.99)	(8.80)
ETF_{it-1}	-0.231***	-0.231***	-0.227***
	(-4.31)	(-4.26)	(-3.83)
Dum_{it-1}	0.001	-0.014*	0.003
	(0.22)	(-1.79)	(0.99)
Other Controls	Included	Included	Included
Adjusted R2	0.779	0.780	0.782
Fixed Effect	Y, F	Y, F	Y, F
N. of Obs.	30750	30862	26692

*$Dum_{it-1} = 1$ if a firm's market beta, industry sales growth volatility or insider trading profitability is in top 30% of the sample in year $t-1$.

ETF Ownership and Future Operating Performance

- If ETFs indeed improve the quality of information relevant to real investment decisions, that should translate into better future operating performance.

$$OP_{it+j} = \alpha_t + \mu_i + \beta_1 ETF_{it-1} + \gamma X_{it-1} + \epsilon_{it+j} \quad (6)$$

	ROA_{it+1}	$AvgROA_{it+3}$	SG_{it+1}	$AvgSG_{it+3}$
ETF_{it-1}	0.129*	0.372***	0.284**	0.469***
	(1.80)	(4.52)	(1.97)	(3.21)
$SIZE_{it-1}$	-0.001	-0.023***	-0.076***	-0.090***
	(-0.36)	(-10.70)	(-15.90)	(-18.49)
MB_{it-1}	0.002***	0.001**	0.003***	0.002*
	(4.20)	(2.41)	(3.32)	(1.74)
Q_{it-1}	0.013***	0.012***	0.026***	0.027***
	(6.06)	(6.37)	(6.26)	(7.66)
LEV_{it-1}	-0.010	0.000	-0.153***	-0.148***
	(-0.97)	(0.01)	(-6.59)	(-6.07)
$CASH_{it-1}$	-0.027***	0.001	0.133***	0.102***
	(-3.59)	(0.12)	(6.60)	(7.14)
$INSTR_{it-1}$	0.008	0.018**	0.026	0.011
	(0.85)	(2.04)	(1.33)	(0.64)
Adjusted R2	0.750	0.809	0.179	0.467
Fixed Effect	Y,F	Y,F	Y,F	Y,F
N. of Obs.	30001	22734	29922	22610

Alternative Explanations

- **Improved Governance:** Improvement in governance associated with higher ETF ownership could strengthen investment-price sensitivity.
  - Passive institutional ownership may improve corporate governance quality (Appel, Gormley and Keim, 2016), although other studies suggest a deteriorating effect (Schmidt and Fahlenbrach 2017; Bebchuk, Cohen and Hirst 2017).

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- **Relaxed financial constraints:** Firms held by more ETFs may have eased access to external financing and investment become more responsive to growth opportunity.
- All these alternatives would predict ETFs also raise firm's investment sensitivity to peers' stock price.

Alternative Explanation 1: Improvement in Corporate Governance

- Under this mechanism, the improved investment-price sensitivity should be especially large for firms with weak prior governance quality.

	G-index			E-index		
	Strong	Neutral	Weak	Strong	Neutral	Weak
	(1)	(2)	(3)	(1)	(2)	(3)
$Q_{it-1} * ETF_{it-1}$	0.597**	0.233***	0.099	0.400**	0.244***	-0.168
	(2.39)	(3.13)	(0.26)	(1.96)	(3.24)	(-0.42)
Q_{it-1}	0.003	0.048***	-0.021	0.029*	0.045***	0.034
	(0.13)	(4.96)	(-0.54)	(1.71)	(4.42)	(0.43)
ETF_{it-1}	-0.664	-0.276*	0.341	-0.956**	-0.298**	0.430
	(-1.16)	(-1.86)	(0.61)	(-2.14)	(-2.03)	(0.66)
Controls	Included	Included	Included	Included	Included	Included
Adjusted R2	0.821	0.822	0.857	0.833	0.824	0.837
Fixed Effect	Y, F	Y, F	Y, F	Y, F	Y, F	Y, F
N. of Obs.	352	4819	248	353	4896	170
$Q_{it-1} * ETF_{it-1}$: *(1)=(3)*			0.858			0.861

Alternative Explanation 2: Better Information Environment

- Under this mechanism, the effect of ETFs on investment-to-price should be particularly large for firms that experience a larger increase in disclosure quality.
  - We use analyst forecast accuracy as proxy for disclosure quality.

	Absolute improvement in forecast accuracy		**Percentage improvement in forecast accuracy**	
	High (1)	Low (2)	High (1)	Low (2)
*Q * ETF*	0.089***	0.094***	0.077***	0.102***
	(3.13)	(2.93)	(2.66)	(3.06)
Q	0.036***	0.037***	0.036***	0.039***
	(6.79)	(6.55)	(6.74)	(6.61)
ETF	-0.204***	-0.250***	-0.175**	-0.239***
	(-2.71)	(-3.29)	(-2.36)	(-3.16)
Controls	Included	Included	Included	Included
Adjusted R2	0.799	0.786	0.804	0.782
Fixed Effect	Y, F	Y, F	Y, F	Y, F
N. of Obs.	11488	11449	11357	11313
*Q * ETF: (1)=(2)*		0.92		0.92

Alternative Explanation 3: Relaxed Financial Constraints

- Regress financial constraints measure of Hoberg and Maksimovic (2015), change of CDS, payout ratio and equity/debt issuance activities on lagged ETF ownership.

	EquityDelayCon	*DebtDelayCon*	dCDS	*PayOut*	*EquityIssue*	*DebtIssue*
ETF_{it-1}	0.004	0.026	0.158**	-0.077**	-0.200***	0.018
	(0.08)	(0.70)	(2.55)	(-2.23)	(-3.24)	(0.10)
Q_{it-1}	0.003***	0.000	-0.003*	0.003***	0.037***	0.013***
	(3.19)	(0.21)	(-1.76)	(3.10)	(12.50)	(4.95)
Controls	Included	Included	Included	Included	Included	Included
Adjusted R2	0.676	0.498	0.246	0.445	0.472	0.519
Fixed Effect	Y, F	Y, F	Y, F	Y, F	Y, F	Y, F
N. of Obs.	21686	21686	3357	28891	28342	27989

*The dependent variable in first two columns are text-based measure of financing constraints developed by Hoberg and Maksimovic (2015). Higher value indicates more binding financing constraints.

Conclusion

- ETF ownership improves investment-q sensitivity of underlying securities
- Consistent with the managerial learning channel, we find:
  - Effect stronger among firms where systematic information is more important and uncertain, and with better privately informed managers.
  - ETF ownership reduces managerial learning from peers' prices.
  - ETF ownership is associated with better operating performance.
- Implications for passive vs. active investing:
  - Although ETFs are largely passive investment instruments, the way investors trade on ETFs are often active
  - The rise of passive investment does not necessarily hinder (may actually improve) price efficiency

Appendix 1: Robustness

- Use the number of ETFs holding the stock as measure of ETF activities.
- Use quarterly data of investment and ETF ownership.
- Use alternative measures of investment including the percentage change of total assets, and Mergers & Acquisitions.
- Control for ownership by other institutions, including index/active mutual funds and hedge funds, and their interactions with Tobin's q.

Appendix 2: ETFs and Informativeness of Insider Trading

- The key assumption in our model is that ETFs reduce outside investors' firm-specific information, while not necessarily managers'
- Test using insider trading: Insiders' trading should become more informative when information asymmetry between insiders and outsiders widen (Aboody and Lev 2000) (Back to main)

	(1)	(2)
NPR	0.0047***	0.0052***
	(3.92)	(2.98)
NPR*ETF	0.1264*	0.1023*
	(1.80)	(1.92)
ETF	-0.0159	0.0085
	(-0.15)	(0.11)
NPR*LogME		-0.0004*
		(-1.87)
NPR*INSTR		0.0006
		(0.37)
Ret(-1)		-0.0251***
		(-3.14)
LogME		-0.0015***
		(-2.65)
LogBM		0.0012
		(1.17)
MOM		-0.0032
		(-0.79)
INSTR		0.0057**
		(2.09)
Constant	0.0111**	0.0156**
	(2.23)	(2.46)
Adj.R-sq	0.008	0.046
N.of Obs.	409098	377585

- *NPR is net purchase ratio of insiders following Lakonishok and Lee (2001)