ETF Ownership and Idiosyncratic Risk

By

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Abstract

Exchange Traded Funds (ETFs) represent and important investment vehicle for both institutional and retail investors. We provide novel evidence that ETF ownership distorts the pricing of idiosyncratic risk leading to overinvestment at the firm level. While we observe that ETF ownership is linked with higher volatility overall, firm specific volatility is decreasing in ETF ownership. This indicates that ETF ownership exposes firms to market induced volatility but dampens the impact of realized idiosyncratic risk. Consistent with this we find evidence that ETF ownership leads to higher levels of idiosyncratic volatility when firm level mispricing is at it's peak. The result of this distortion is a significantly lower cost of capital for firms and a resulting increase on R&D spending. Together our results demonstrate that ETFs play an important role in the capital allocation mechanism of financial markets but ultimatelyy lead to overinvestment thanks to an artificially low cost of capital.

[1]

1. Introduction

As of Q1 2024, Exchange-traded funds (ETFs) have 7.1 trillion in assets under management (AUM) which is double the AUM from 20189. Further ETFs make up to 28.1

[1] We thank Stuart Gillan, Jeffrey L. Coles, and all the seminar participants at the University of North Texas for their insightful suggestions and constructive feedback.

percent of trading volume on US exchanges.[2] The growth of this industry has led to a two fold increase in the number of company shares held by ETFs since 2012 (Figure 1). Though this growth has been regarded as a positive for investors little research has been done on the impact of ETF ownership at the firm level. We provide novel evidence that ETF ownership causes a distortion in the pricing of idiosyncratic risk leading to over investment at the firm level.

ETFs hold a diversified basket of stocks, and their shares are traded on major exchanges, offering liquidity and diversification for investors. In the primary market, Authorized Participants (APs) are responsible for the creation and redemption of ETF shares. In contrast, investors in the secondary market can trade ETF shares. When a price mismatch arises between the ETF share price and the net asset value (NAV) of its underlying assets, arbitrage opportunities appear. Traders capitalizing on price differentials plays a critical role in ensuring the ETF pricing deviations do not grow too wide. Due to their well diversified nature ETFs largely reflect a combination of industry and macroeconomic risk depending on the methods detailed to investors in the prospectus.

The Impact of ETFs on broad financial markets has been widely analyzed. Ben David et al.(2018) shows that ETF ownership attracts high-frequency traders and increases the underlying stock's volatility. Their findings conclude that ETFs may pose a new form of systematic risk. This agrees with findings in Da and Shive (2015) that ETF ownership is associated with higher covariance in the underlying stocks. Agarwal et al. (2018) show that ETF ownership also influence on covariance extends to liquidity. Together these

[2]For details, see Global ETF Market Facts: three things to know from Q1 2024 | iShares - BlackRock

findings imply ETF ownership may propagate systematic risk. This is confirmed in Rhodes & Hill-Kleespie (2025) who show that ETF ownership distorts the price response of ETF constituents to changes in Federal Reserve policy.

The effects of ETF ownership on underlying stocks extends to price efficiency as well. Israeli et al. (2017) show that ETF ownership is associated with higher trading costs which serves as a natural barrier to arbitrage. Additionally,they find that ETF constituents are less responsivene to earnings news and there is a resulting decline in analyst coverage. Combined, this suggests that ETF ownership leads to reduced price efficiency.

The increase in common covariance of returns (Da and Shive (2015)) and liquidity (Agarwal et al. (2018)) combined with a decrease in price efficiency (Israeli et al. (2017)) indicates that the risk return in ETF constituents may be distorted. In particular, ETF ownership seemingly amplifies the pricing of systematic risk while leading to a decrease in firm-specific risk.

Overall, these studies suggest that ETF ownership adds a layer of trading that distorts the pricing process and decreases the market efficiency. However, from an equilibrium standpoint, the Capital Asset Pricing Model(CAPM) theory can serve as an equilibrium force to this distortion. In a hypothetical scenario without trading effects, if all outstanding shares were linked by ETFs, systematic risk would dominate the pricing process. Firm-specific risk would lose relevance as investors would have less incentive to respond to marginal information changes from individual stocks within the ETF basket.

This goal of our study is to examine whether ETF ownership not only alters how risk is priced in capital markets but whether this alters firm level behavior. According to a J.P. Morgan (2024) report, the 10 largest U.S. stocks by market cap account for approximately

29.4% of the total equity market. Given that all of these companies, and a sizeable portion of their shares, are held in ETFs understanding the impact of ETF ownership on firm-specific risk is crucial for both academics and investment practitioners.

To determine the effect of ETF ownership on the pricing of firm specific risk we follow Fu's (2009) methodology and define idiosyncratic risk as the standard deviation of the residuals from the Fama-French (2015) five-factor model.

Our results confirm the hypothesis that ETF ownership decreases the pricing of firm level risk while propagating systematic risk. Specifically, we find that increasing ETF ownership is associated with an increase in overall volatility but a decrease in idiosyncratic volatility. Our results show that a one standard deviation increase in ETF ownership is associated with a decrease in idiosyncratic volatility by approximately 0.27% of a standard deviation in the cross-section of stocks.

Next, we explore how these results differ during trading and non-trading hours. Hendershott et al. (2020) highlight a positive beta-return relation during non-trading hours compared to times when the market is open. Further, Bougaslavvsky (2021) finds that mispricing measures rise during trading hours but are lower during non-trading hours. Building on this, we examine how the relationship between idiosyncratic volatility and ETF ownership varies during trading and non-trading hours. If ETFs are propagating systematic risk while dampening idiosyncratic risk we should expect to see differential effects during trading and non-trading hours

Our findings show that ETF ownership is positively associated with stock return volatility during trading hours but negatively associated with stock return volatility during non-trading hours. We interpret the decrease in stock level volatility during non-trading

hours as evidence of an increase in common covariance due to a single form of priced risk. During trading hours, arbitrageurs are able to correct some, but not all, of this mispricing due to amplified systematic risk leading to higher levels of volatility for stocks heavily owned by ETFs.

We also find that ETF ownership is negatively associated with stock idiosyncratic volatility during both trading and non-trading hours. This is consistent with prior results showing a decrease in idiosyncratic risk despite an increase in overall volatility. Together these results suggest that ETF ownership amplifies the effect of systematic risk on prices while dampening the influence of idiosyncratic risk.

If equity prices do not fully reflect idiosyncratic risk and propagate macroeconomic risk it is possible that this will alter cost of capital and firms' risk-taking decisions. To explore this, we adopt the methodology of Gerhardt et al. (2001), using analyst forecasts on firm earnings to estimate the implied cost of capital (ICC). This approach allows us to assess the impact of ETF ownership on a firm's ICC. Our findings indicate that ETF ownership is negatively associated with the implied cost of capital.

If cost of capital is declining in ETF ownership firm's may find it easy to finance short term projects while finding securities offered to finance long term projects offer lower rates of return than the market requires. T oexamine this we analyze changes in expenditures on both Research & Development (R&D) and Property, Plant & Equipment (PP&E). Our results show that ETF ownership is positively correlated with a firm's R&D spending, while it is negatively associated with capital expenditure (CAPEX). These findings suggest that ETF ownership may influence firms' strategic investment decisions,

encouraging innovation-driven spending while reducing more traditional forms of capital investment.

Our study contributes to the existing literature on ETF ownership broadly. We show ETF ownership decreases idiosyncratic risk while amplifying systematic risk. We also contribute to the literature on differences between trading and non-trading hours by showing that the increase in volatility in ETF ownership appears to be driven by increased arbitrage activity working to correct these amplifications during daytime trading hours. Finally, we show that not-only does ETF ownership alter the levels of systematic and idiosyncratic risk in portfolio securities but these effects lead to changes in cost of capital and firm behavior in predictable ways.

In Section 2, we discuss the theoretical background and motivation for our hypotheses. Section 3 outlines the data sources and methodology used in the study. In Section 4, we present our preliminary results. Finally, Section 5 summarizes the conclusions of this research.

2. Literature Review and Hypothesis

2.1 ETF effect on stock volatility

The theoretical foundation for the impact of ETF ownership on the price discovery process can be traced back to the broader question of how financial derivatives influence their underlying assets. Stein (1987) found that speculation in the futures market can destabilize the spot market. ETFs share some of the characteristics of futures markets, particularly in the realm of riskless arbitrage trading. Arbitrage occurs when there is a price discrepancy between the ETF and the underlying basket of stocks it represents. However, the arbitrage mechanism in ETFs operates on two distinct levels.

The first level is the primary market, where ‘authorized participants’ (Aps), who have agreements with the ETF provider, can trade bundles of ETF shares. These shares are then traded in the secondary market, where retail and institutional investors participate according to their trading intentions. Occasionally, the price of ETF shares in the secondary market may deviate from the value of the underlying basket of stocks, prompting arbitrage trading to realign the two prices. This trading behavior can influence the volatility of the underlying assets. For instance, Ben-David et al. (2018) found that ETF ownership increases the volatility of the underlying stocks.

An alternative perspective is rooted in the Capital Asset Pricing Model (CAPM) theory. Modern portfolio theory posits that every investor is inevitably exposed to systematic risk, which, as a result, is correctly priced in equilibrium. ETFs are predominantly passive, index-following products, meaning their trading activity is more influenced by macroeconomic news rather than firm-specific information. Under extreme conditions, if ETFs owned all outstanding shares in the market, systematic risk would dominate stock return structures, implying the potential paling effect of firm-specific risk. Da & Shive (2014) document increased co-movement within stock baskets of ETFs. This relation distorts the correlation among stocks.

Using a noisy rational expectations equilibrium model, Buss&Sundaresan(2023) show that passive ownership positively affects the informational efficiency of firms. Passive ownership makes the demand for firm stock more inelastic. This drives down the firm’s cost of capital, inducing it to take more risk.

Hypothesis I: An increase in ETF ownership is positively associated with an increase in overall stock return volatility. However, ETF ownership is negatively related to the idiosyncratic volatility of individual stocks.

2.2 ETF affects stock differently between day and night.

Hendershott et al. (2020) highlight that the Capital Asset Pricing Model (CAPM) performs better during non-trading hours compared to market open hours. They find that market risk (beta) is positively related to returns during non-trading hours but negatively associated with returns during market open hours. Building on their study, it is suggested that when trading ceases, ETF arbitrage activity also stops, which reduces the forces that typically increase stock volatility. As a result, only the information dissemination effect remains active in the pricing process during non-trading hours.

Hypothesis II: A general increase in ETF ownership positively correlates with a rise in stock return volatility. In contrast, ETF ownership tends to reduce stock volatility during non-trading hours.

2.3 Implication for firm's capital structure

Previous studies have demonstrated that realized returns are a biased proxy for a stock's expected return (e.g., Blume and Friend, 1973; Sharpe, 1978; Froot and Frankel, 1989; Elton, 1999). Fama and French (1997) argue that using ex-post realized returns to estimate ex-ante expected returns is "inevitably imprecise." Given the challenges in identifying the appropriate asset pricing model, a more straightforward approach that requires a less

complex model to estimate the cost of equity capital is desirable. Gebhardt et al. (2000) propose a discounted residual income model, which uses market prices and analyst forecasts of future cash flows to estimate the implied cost of equity capital. This approach allows for the measurement of the implied cost of equity capital without relying on realized returns or traditional asset pricing models. Hou et al. (2012) further address potential biases in analyst forecasts by employing a cross-sectional model to generate forecasts of future cash flows.

Hypothesis III: An increase in ETF ownership is positively associated with a higher implied cost of capital for the firm.

2.4 Implication for firm's investment decision

The cost of equity capital plays a crucial role in capital budgeting and other areas of corporate finance. Accurate estimation of the cost of equity capital enables firm managers to adjust the firm's risk-taking behavior and gain a better understanding of the risk-return profile of projects, leading to more informed investment decisions. Coles, Daniel, and Naveen (2006) provide a framework for analyzing the relationship between managerial compensation and a firm's risk-taking behavior. Building on their methodology, we measure the effect of ETF ownership on a firm's risk-taking behavior.

Hypothesis IV: A rise in ETF ownership is positively correlated with increased research and development (R&D) expenses but negatively associated with capital expenditures (CAPEX) of the firm.

3. Methodology and Data

we use the center for research in security price (CRSP), COMPUSTAT, and ETF global data to identify ETF holding and to extract return, price, and share outstanding. The initial sample content was 8,153,115 daily observations between 2012 to 2023.

Our main regression equation as follows:

$$(1) Idiosyncratic\ Volatility_i = ETF\ Ownership_i + Controls$$

$$(2) Day\&Night\ return\ volatility\_i = ETF\ Ownership\_i + Controls$$

$$(3) ICC/R\&D/CAPEX\_i = ETF\ Ownership\_i + Controls$$

To measure the ETF ownership. We follow the equation below by summing all ETF daily holding market value on a single stock divided by the stock's daily market value.

$$\text{ETF ownership}_{i,t} = \frac{\sum_{j=1}^{J} w_{i,j,t} \cdot \text{AUM}_{j,t}}{\text{MC}_{i,t}}$$

Idiosyncratic risk is defined as risk that is unexplained by the market risk. So we can say this part of risk is driven by firm-specific information which is independent of the general market movement. Following Fu Fangjian(2009) and AHXZ(2006), we measure the idiosyncratic risk of individual stock as follows. Daily return of individual stocks are regressed on the daily Fama-French (2015) five factors: (1) market excess return (Rm-Rf),(2)the difference between the return on a portfolio of small stocks and the return on a portfolio of big stocks.(3)the difference between the return on a portfolio of high book to

market stocks and the return on a portfolio of low book to market stocks.(4)the difference between the return on a portfolio of stocks with high operational profitability and the return on a portfolio of stocks with low operational profitability.(5) the difference between the return on a portfolio of stocks with high investment and the return on a portfolio of stocks with low investment.

(4) $$R_{it} - r_t = \alpha_{it} + \beta_{it}(R_{mt} - r_t) + s_{it}\mathrm{SMB}_t + h_{it}\mathrm{HML}_t + p_{it}\mathrm{OP}_t + i_{it}\mathrm{INV}_t + \epsilon_{it}$$

i is the notation for the stock i and t is the notation for the day. Daily stock returns are obtained from the Center for Research in Security Price(CRSP). The daily factor data are downloaded from Kenneth R. French's website. Then monthly time series regression is performed on each stock. The idiosyncratic volatility of a stock is measured as the standard deviation of the regression residuals. Like in the previous research. We require a minimum of 15 trading days in a month and non-zero trading volume to reduce the impact of infrequent trading. We limit ETF ownership between 0 and 1. Also, we transform the standard deviation of daily return residuals to monthly return residuals by multiplying the daily standard deviation by the square root of the number of trading days in that month. Table 2 shows the summary statistics for the residual and ETF ownership. Then we divide our sample into ten deciles based on their ETF ownership, as shown in Table 2. There is an increasing trend in return volatility and a decreasing trend in idiosyncratic volatility. Then we use the Fama French market break point to further divide our sample into small firms and big firms based on the market cap of each stock. We define small firms as the smallest 15% market cap among our samples and big firms as the biggest 10% market cap among our sample. Table 3 shows that this trend continues in small firms. However, we observe an increase in idiosyncratic volatility in big firms. This implies that information

symmetric dominates the risk of small firms and arbitrage trading dominates the risk of big firms.

4, Result

We start by looking at how ETF ownership affects the idiosyncratic volatility of stocks. To test our hypothesis, we try to test that ETF arbitrage introduces an additional layer of trading which in turn boosts up the return volatility. However, these trading are mainly driven by macro news which in turn makes the stock more sensitive to systematic news and less sensitive to their own firm-specific news. Table 5 shows the idiosyncratic volatility results; The regression shows that a one standard deviation increase in ETF ownership is associated with lower idiosyncratic volatility by around 0.28% of a standard deviation. The effect seems economically important.

Table 6 shows the return volatility results. The regression shows that a one standard deviation increase in ETF ownership is associated with higher return volatility by around 0.17% of a standard deviation. The effect seems economically important.

Terrence et al.(2020) show that Market risk behavior differs between day and night. Lou et al.(2019) define night return on date t:

$$(5)\ R_t^N = \frac{1+R_t^{close\ to\ close}}{1+R_t^{open\ to\ close}} - 1$$

We calculate the night return in our sample and further calculate the night residual and day residual using the Fama French 5 factor. Then, we can investigate how idiosyncratic volatility and return volatility perform during day and night. Table 7 shows that day and night idiosyncratic volatility both decreasing as ETF ownership increases. However, return volatility only increases during the day and decreases during the night as ETF ownership

increases. Since there is limited trading arbitrage during the night this matches our previous argument. Two forces are impacting the risk of ETF underlying stock. The first one is an additional layer of arbitrage trading increases the volatility of the underlying stocks. The second one is information-driven force which make the ETF underlying stock more passive. This makes them less sensitive to their firm-specific news and makes the pricing more inefficient.

Next step, we try to analyze how the implied cost of capital is affected by ETF ownership. We use four measurements from the previous studies to calculate the implied cost of capital. Then we take the average of the four estimations to build our implied cost of capital composite. The first study we follow is Gebhardt et al.(2000) we measure the implied cost of capital by the following equation:

$$(6)\ P_t = B_t + (FROE_{t+1} - r_e)/(1 + r_e) * B_t + (FROE_{t+2} - r_e)/(1 + r_e)\text{^}2 * B_{t+1} + TV$$

$$(7)\ \mathrm{TV} = \sum_{i=3}^{T-1} FROE - r_e/(1 + r_e)\text{^}i * B_{t+i-1} + \frac{FROE_{t+T} - r_e}{r_e(1 + r_e)^{T-1}} * B_{t+T-1}$$

We use data from I/B/E/S summary statistics to obtain the forecast DPS for the next two years. The summary statistics are published every third Thursday of each month. Then we calculate the FROE by using forecast FEPSt+i/Bt+i−1. Beyond the second year, the FROE follows a mean reversion trend to the median of the industry median which is sorted by the first two digits of each firm's SIC code. B_{t+1} is the forecast book value per share which is equal to $B_t + Ni_{t+1}(1-k)$, where k is the dividend payout ratio. For firms with negative earnings, we use dividend divided by total asset*0.06(long run ROA in the US) to keep the payout ratio between 0 and 1. Then, we use the monthly stock price of each firm to estimate the cost of capital by trial-and-error method.

The second study we follow Is Claus and Thomas (2001), the equation we follow is the following:

$$(8)\ P_t = BPS_t + \sum_{k=1}^{5} \frac{E_t[(ROE_{t+k} - R) \times BPS_{t+k-1}]}{(1+R)^k} + \frac{E_t[(ROE_{t+5} - R) \times BPS_{t+4}](1+g)}{(R-g) \times (1+R)^5}$$

The last two studies we follow are Easton(2004) and Gordan and Gordan(1997), the two-equations listed as follow:

$$(9)\ P_t = \frac{E_t[E_{t+2}] + R \times E_t[Div_{t+1}] - E_t[E_{t+1}]}{R^2}$$

$$(10)\ R = \frac{E_t[EPS_{t+1}]}{P_t}$$

Finally, we took a simple average of all four measures above, to build our implied cost of capital composite. The summary results are shown in Table 8, we can see that there is a linear decreasing trend for all five ICC measurements as ETF ownership increases.

We obtain the monthly data of ten-year treasury bond yield from the Federal Reserve Bank of St. Louis. Finally, our implied cost of capital is the estimation of the cost of capital minus the ten-year treasury bond yield.

The debt-to-book ratio is calculated using the value of current long-term debt divided by the current book value per share as a financial leverage proxy. The market cap is the monthly stock price time by the share outstanding and serves as SIZE proxy. The book-to-market is used as a VALUE proxy. BETA is calculated by 36-month rolling regression using monthly data and the value-weighted market return from CRSP. The Capital Asset Pricing Model (CAPM) suggests stock's market BETA is positively related to its cost of capital. Madden(1998) shows that the variability of reported earnings is a source of risk for firm valuation. We use the dispersion of analyst forecast as poxy for this variation which is calculated by the coefficient of variation of the current year ROE forecast. The entire sample was then grouped by Fama French 48 industry category.

The results in Table 9 indicate that a one percent increase in ETF ownership is associated with a 0.017 percent decrease in the implied cost of capital, a finding that is statistically significant at the 99% confidence level. This result is also economically meaningful. We further investigate the implications of increased ETF ownership on firm investment decisions by following the methodology of Coles, Daniel, and Naveen (2006). Specifically, we examine the effects on firms' R&D expenses and CAPEX investments. The results in Table 10 reveal that an increase in ETF ownership is positively correlated with R&D expenses and negatively correlated with CAPEX investments. Specifically, a one percent increase in ETF ownership is associated with a 0.019 percent increase in R&D expenses after controlling for industry and time-fixed effects (based on the first two digits of the SIC code) and a 0.047 percent increase after controlling for firm and time fixed effects. Regarding CAPEX, we did not find any significant relationship with ETF ownership.

5, Robust Test

To strengthen causal inference for our main findings, we employ a two-stage least squares (2SLS) framework using Russell 2000 index additions and deletions as instrumental variables for ETF ownership. We obtain index constituent changes between 2012 and 2024 from the Siblis Research database. The intuition behind this identification strategy is that most ETFs in our sample are index-linked; thus, changes in index membership mechanically trigger corresponding adjustments in ETF portfolios to maintain their benchmark alignment. When a stock is added to or deleted from the Russell 2000 index, ETFs tracking the index must buy or sell the stock accordingly. This mechanical rebalancing makes index additions and deletions strong predictors of ETF ownership

(relevance condition), while the reconstitution itself is unrelated to firms' idiosyncratic volatility, satisfying the exclusion restriction. So we can set up our 2SLS test as follows:

First stage:

$$(10) ETF\ \widehat{Ownership}_i = Index\ addition_i + Index\ dletion_i + Controls$$

Second stage:

$$(11) Idiosyncratic\ volatility_i = ETF\ \widehat{Ownership}_i + Controls$$

As shown in Table 11, the Russell 2000 index addition serves as a weak but positive instrument for ETF ownership, whereas index deletion exhibits a strong and negative association with ETF ownership. In the second stage, the fitted (predicted) ETF ownership remains negatively and significantly related to firm-level idiosyncratic volatility. This result suggests that even when we isolate the exogenous variation in ETF ownership driven purely by index rebalancing, higher ETF ownership continues to be associated with lower idiosyncratic risk. The finding reinforces our causal interpretation that the observed relationship is not merely correlational but reflects a real effect of ETF trading activity—through mechanisms such as information aggregation, arbitrage, and enhanced liquidity—on reducing firm-specific volatility.

6, conclusion

In this study, we analyze the effects of ETF ownership on the information efficiency of firm-specific news. Our results indicate that ETF ownership is negatively associated with stock idiosyncratic volatility, suggesting that increased ETF ownership makes firms less sensitive to firm-level news. While previous studies have shown that ETF ownership generally increases stock volatility, our findings demonstrate that this effect is concentrated

during trading hours when ETF trading occurs. During non-trading hours, the information dissemination effect predominates, leading to a decrease in stock volatility.

We also examine the impact of ETF ownership on a firm's cost of equity capital and risk-taking behavior. Our results show that ETF ownership is negatively associated with the implied cost of equity capital. Firms appear to respond to this effect by increasing R&D investments.

There are a few limitations to this research that should be noted. First, the ETF Global data only covers the period from 2012 to 2023. A longer time period could enhance the robustness of our results. Second, while most of the relationships we identify are statistically significant, future research could employ more rigorous causality tests to strengthen our arguments. Third, future studies could explore how bond ETF ownership affects firm characteristics, making the findings more comprehensive. As Jensen Meckling (1976) notes, bonds hold a more senior position in the capital structure but are closely related to equity financing. A decrease in the cost of equity capital can have a chain effect on the cost of debt as well. In our preliminary analysis using proprietary bond data, our results show promising potential for future research in this area.

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Figure 1.

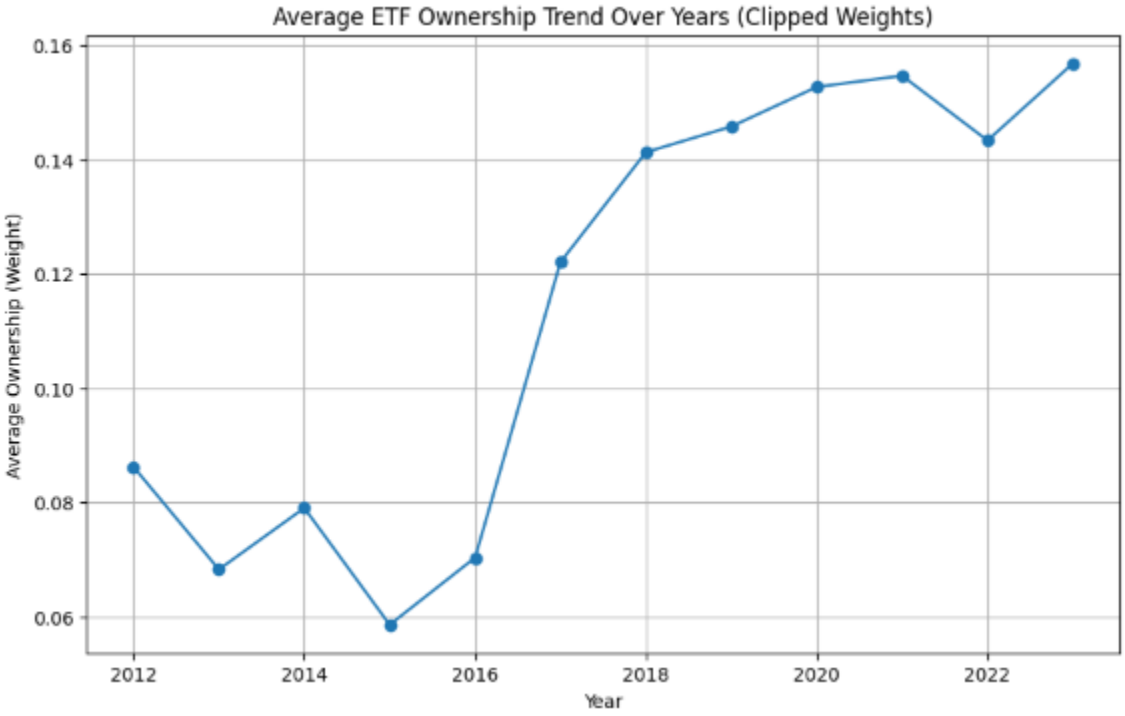

Figure 2. average daily market value held by ETF during the sample period increased from 1 trillion in 2014 to almost 6 trillion in 2023.

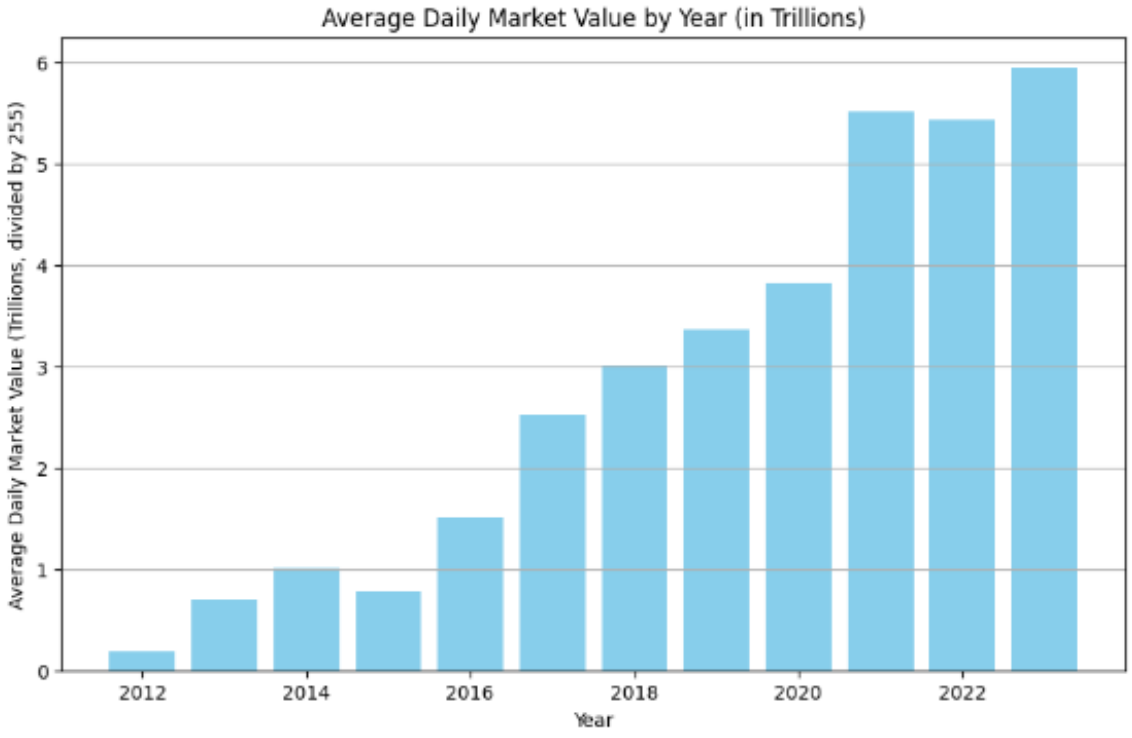

Table 1. summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
etf_ownership	400,472	0.0640	0.0501	0.0000	0.9694
IVOL	395,319	9.1793	7.4656	0.1876	731.3895
night_IVOL_adj	400,472	4.9014	4.7289	0.1546	191.8435
day_IVOL_adj	400,472	8.6970	5.7084	0.0895	148.6815
RVOL	400,472	10.8517	8.1863	0.0741	738.4730
night_RVOL_adj	400,472	5.2444	4.9961	0.0952	192.0299
day_RVOL_adj	400,472	9.5997	6.1642	0.1139	156.6320
value	383,212	-3.5984	1.6875	-6.6820	9.4942
inv	386,002	0.0006	0.0149	-0.0600	6.2239
log_Mktcap	400,472	7.3754	1.8189	1.3959	14.9214
inv_Price	400,472	0.0508	0.0437	0.0001	0.1990
Amihud	400,472	0.7254	3.9229	0.0001	276.9492
Bid_ask_spread	400,472	0.0337	0.0194	0.0002	0.3356

Table 2. 10 decile sort on ETF ownership

OWNERSHIP DECILE	IVOL	RVOL	OWNERSHIP
1	9.3739% (7.6199%)	11.0095% (8.9803%)	0.2241% (0.1426%)
2	8.7763% (7.2559%)	11.7191% (9.9656%)	1.5264% (1.5403%)
3	8.7412% (7.2951%)	11.8800% (9.7919%)	2.9011% (2.9064%)
4	7.5702% (6.1843%)	10.8339% (8.8447%)	4.0673% (4.0766%)
5	7.1774% (5.8973%)	10.3273% (8.8379%)	5.0340% (5.0295%)
6	7.2964% (5.9465%)	10.3400% (8.3860%)	6.1187% (6.1102%)
7	7.4749% (6.1551%)	10.4344% (8.5234%)	7.4364% (7.4316%)
8	7.4473% (6.1129%)	10.1710% (8.4224%)	9.0072% (8.9818%)
9	7.7799% (6.3043%)	10.4872% (8.6665%)	11.3200% (11.2081%)
10	8.6252% (7.0729%)	11.5344% (9.6645%)	16.5420% (15.4202%)
Diff between 10 and 1	-0.7541901***	0.0052485***	0.1613788***
t stat	53.5078	37.4603	28

Note: median value in parenthesis.

Table 3. 10 decile sort on ETF ownership on the small firms

OWNERSHIP DECILE	IVOL	RVOL	OWNERSHIP
1	11.62105% (9.1926%)	11.2033% (9.0186%)	0.0869% (0.0578%)
2	11.28066% (9.2776%)	12.5393% (10.5569%)	0.0626% (0.4643%)
3	10.17258% (8.7126%)	12.5747% (10.5337%)	1.6809% (1.6830%)
4	10.2080% (8.7341%)	12.7796% (10.5920%)	2.5913% (2.5916%)
5	9.9325% (8.4301%)	12.4094% (10.4538%)	3.4475% (3.4531%)
6	9.3880% (7.9989%)	12.1423% (10.1663%)	4.2804% (4.2756%)
7	9.8702% (7.5016%)	11.3115% (9.8096%)	5.1922% (5.1753%)
8	9.5883% (7.8392%)	12.3626% (10.1773%)	5.6306% (6.4843%)
9	9.4652% (7.6847%)	12.2797% (10.1849%)	8.5563% (8.4185%)
10	10.9723% (9.1277%)	13.7675% (11.6536%)	14.8402% (13.9204%)
Diff between 10 and 1	-0.6488***	0.0256***	0.1475***
t stat	19.1426	89.8924	150

Note: median value in parenthesis.

Table 4. 10 decile sort on ETF ownership on the big firms

OWNERSHIP DECILE	IVOL	RVOL	OWNERSHIP
1	4.3934% (3.8657%)	6.1391% (5.4330%)	0.4423% (0.2994%)
2	4.4908% (3.9317%)	6.1644% (5.4469%)	2.9661% (3.2225%)
3	4.4852% (4.0330%)	6.0864% (5.3044%)	3.8983% (3.9062%)
4	4.7573% (4.1320%)	6.8237% (5.7507%)	4.2268% (4.2678%)
5	4.9503% (4.3150%)	6.7486% (5.8138%)	4.5871% (4.5841%)
6	5.0304% (4.3847%)	7.1102% (6.1532%)	4.9247% (4.9262%)
7	5.0094% (4.5040%)	6.9154% (6.1161%)	5.2771% (5.2719%)
8	4.9871% (4.4348%)	6.8953% (5.9625%)	5.7196% (5.7159%)
9	5.6882% (4.8744%)	7.9120% (6.4596%)	6.4355% (6.3288%)
10	5.4394% (4.7500%)	7.1288% (6.2067%)	8.0863% (7.7404%)
Diff between 10 and 1	1.045099***	0.0089967***	0.0746393***
t stat	44.7676	31.5022	52

Note: median value in parenthesis.

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Table 5. dependent variable on standard deviation of idiosyncratic volatility

VARIABLES	**IVOL**			
std_etf_ownership	-0.2772***	-0.2805***	-0.1077***	-0.1448***
	0.012	0.0123	0.019	0.0223
std_log_Mktcap	-0.1497***	-0.0602***	-0.4967***	-0.1606***
	0.0101	0.01	0.0387	0.0419
std_inv_Price	-0.0533***	-0.1423***	-0.4063***	-0.4183***
	0.0103	0.0102	0.0201	0.0201
std_Amihud	1.1011***	1.1947***	0.6789***	0.7602***
	0.0229	0.0226	0.0271	0.0265
std_Bid_ask_spread	7.7844***	8.3809***	7.8927***	9.2741***
	0.0118	0.0133	0.0157	0.0196
Constant	9.1848***	9.1864***	9.1870***	9.1909***
	0.0078	0.0077	0.0075	0.0073
CONTROL				
YEAR_MONTH	no	yes	no	yes
FIRM	no	no	yes	yes
Adj R squared	0.567	0.583	0.604	0.624
Observations	395,319	395,319	395,177	395,177

*Note: Standard error display below coefficient number. *** p<0.01, ** p<0.05, * p<0.1*

Table 6. dependent variable on standard deviation of return volatility

VARIABLES	RVOL			
std_etf_ownership	0.1736***	0.1701***	0.2726***	0.2681***
	0.0114	0.0117	0.0181	0.0215
std_log_Mktcap	0.3701***	0.3491***	0.1573***	0.2109***
	0.0096	0.0096	0.037	0.0404
std_inv_Price	-0.2289***	-0.2188***	-0.3156***	-0.3712***
	0.0098	0.0098	0.0192	0.0194
std_Amihud	1.1052***	1.0558***	0.7847***	0.7783***
	0.021	0.0207	0.0257	0.0253
std_Bid_ask_spread	9.6070***	9.4734***	10.5285***	10.6682***
	0.0112	0.0127	0.015	0.0189
Constant	10.8585***	10.8584***	10.8606***	10.8612***
	0.0074	0.0073	0.0071	0.007
CONTROL				
YEAR_MONTH	no	yes	no	yes
FIRM	no	no	yes	yes
Observations	400,472	400,472	400,330	400,330
Adj_R-squared	0.669	0.68	0.695	0.705

*Note: Standard error display below coefficient number. *** p<0.01, ** p<0.05, * p<0.1*

Table 7. day and night IVOL and RVOL performance.

VARIABLES	Std_IVOL		Std_RVOL	
	Day	Night	Day	Night
Std_ETF_ownership	-0.1356***	-0.1204***	0.0328***	-0.0647***
	0.017	0.0152	0.0081	0.0141
Std_log_Marketcap	-0.1421***	0.1626***	0.0492***	0.2418***
	0.0155	0.0258	0.0133	0.0259
Std_log_value	-0.0809***	0.0093	-0.1356***	0.0006
	0.0121	0.0176	0.0095	0.0179
Std_Amihud	0.3939***	0.7473***	0.3622***	0.7342***
	0.0413	0.0721	0.0402	0.0705
Std_bid_ask_spread	5.2710***	2.4812***	5.8589***	2.6038***
	0.0207	0.031	0.0174	0.0311
Constant	8.6970***	4.9014***	9.5997***	5.2444***
	0.009	0.0129	0.0067	0.0131
CONTROL				
YEAR_MONTH	yes	yes	yes	yes
Observations	400,472	400,472	400,472	400,472
Adj_R-squared	0.8243	0.306	0.8700	0.3689

*Note: Standard error display below coefficient number. *** p<0.01, ** p<0.05, * p<0.1*

Table 8. Implied cost of equity capital.

Panel A.

Ownership Decile	avg_ICC_GLS	avg_ICC_CT	avg_ICC_Gordan	avg_ICC_MPEG	avg_ICC_composite	avg_etf_ownership
1	0.1516	0.1641	0.0744	0.3037	0.1735	0.0043
2	0.1612	0.1747	0.0555	0.3097	0.1753	0.0251
3	0.1383	0.1527	0.0564	0.2596	0.1518	0.0416
4	0.1301	0.1454	0.0548	0.2395	0.1425	0.0554
5	0.1240	0.1386	0.0554	0.2365	0.1386	0.0713
6	0.1101	0.1258	0.0567	0.2123	0.1262	0.0885
7	0.1068	0.1225	0.0564	0.2035	0.1223	0.1074
8	0.1063	0.1218	0.0558	0.2015	0.1214	0.1324
9	0.0960	0.1009	0.0606	0.1966	0.1136	0.1667
10	0.0966	0.0936	0.0690	0.2248	0.1210	0.2331
1-10	-0.0549	-0.0706	-0.0054	-0.0789	-0.0524	0.2288

Note: The last row is all significant at 1% level.

Panel B.

Statistic	ICC_GLS	ICC_CT	ICC_GORDAN	ICC_MPEG	ICC_COMPOSITE
count	426987	426987	425408	426987	426987
mean	0.1213	0.1317	0.0643	0.2460	0.1409
std	0.1767	0.2315	0.0961	0.2982	0.1474
min	0.0000	0.0000	0.0000	0.0328	0.0082
25%	0.0603	0.0000	0.0180	0.0882	0.0634
50%	0.0799	0.0739	0.0488	0.1165	0.0846
75%	0.1030	0.1099	0.0754	0.2000	0.1313
max	1.0000	1.0000	0.7620	1.0000	0.9405

Table 9. Implied cost of capital effect.

VARIABLES	IMPLIED COST OF CAPITAL			
ETF_ownership	-0.0133***	-0.0108***	-0.0194***	-0.0165***
	-0.0008	-0.0008	-0.0008	-0.0008
Ln (debt/market)	0.0337***	0.0366***	0.0318***	0.0342***
	-0.0005	-0.0006	-0.0005	-0.0006
Ln (market cap)	-0.0318***	-0.0333***	-0.0341***	-0.0359***
	-0.0008	-0.0008	-0.0008	-0.0008
Ln (book/market)	0.1896***	0.1915***	0.1876***	0.1896***
	-0.0015	-0.0016	-0.0015	-0.0016
Ln (dispersion)	0.0505***	0.0392***	0.0489***	0.0371***
	-0.0011	-0.0011	-0.0011	-0.0011
Beta	0.1030***	0.0749***	0.1063***	0.0792***
	-0.0021	-0.0021	-0.0021	-0.0021
Constant	-5.6722***	-5.5784***	-5.6750***	-5.5860***
	-0.0208	-0.0207	-0.0207	-0.0206
CONTROL				
YEAR FIX	No	No	Yes	Yes
FF 48 INDUSTRY	No	yes	No	Yes
Observations	160,014	160,014	160,014	160,014
Adj_R-squared	0.24	0.272	0.249	0.28

*Note: Standard error display below coefficient number. *** p<0.01, ** p<0.05, * p<0.1*

Table 10. R&D and CAPEX effect.

VARIABLES	R&D Expense		CAPEX	
ETF Ownership	0.0194*	0.0470***	-0.001	-0.0074
	-0.0111	-0.0139	-0.0065	-0.0107
Ln(Sales)	-0.0104***	-0.0122***	-0.0009***	0.0003
	-0.0003	-0.0008	-0.0002	-0.0006
Market-to-Book	0.0099***	0.0061***	0.0028***	0.0026***
	-0.0003	-0.0004	-0.0002	-0.0002
Surplus Cash	0.1417***	-0.0402***	-0.0288***	-0.0343***
	-0.0031	-0.0036	-0.0017	-0.0026
Sales Growth	-0.0061***	-0.0051***	0.0058***	0.0028***
	-0.0012	-0.0009	-0.0006	-0.0006
Stock Return	-0.0062***	-0.0028***	-0.0022***	-0.0024***
	-0.0006	-0.0004	-0.0003	-0.0003
Book Leverage	0.0454***	0.0305***	-0.0058***	-0.0230***
	-0.0024	-0.0029	-0.0014	-0.0021
Constant	0.0572***	0.1037***	0.0369***	0.0355***
	-0.0024	-0.0059	-0.0013	-0.0041
CONTROL				
PERMNO	No	yes	no	Yes
SIC TWO DIGIT	yes	no	yes	No
YEAR	yes	yes	yes	yes
Observations	29,809	29,299	22,365	21,763
Adj R-squared	0.3975	0.7962	0.2959	0.6097

*Note: Standard error display below coefficient number. *** p<0.01, ** p<0.05, * p<0.1*

Table 11. 2SLS test on the idiosyncratic volatility uses the Russel 2000 index addition and deletion event as instrumental variables.

First stage		Second stage (2SLS)	
VARIABLES	***Etf_ownership***	**VARIABLES**	**IVOL**
Russell2000addition	0.016*	*Etf_ownership_fitted*	-1.870**
	-0.009		-0.813
Russell2000deletion	-0.141***		
	-0.012		
std_log_mktcap	-0.052***		
	-0.02		
std_inv_price	-0.043***		
	-0.008		
std_amihud	-0.007		
	-0.004		
std_bid_ask_spread	-0.008		
	-0.005		
std_value	0		
	0		
Constant	0.001***	*Constant*	-0.058***
	0		-0.003
Observations	382,843	**Observations**	377,972
R-squared	0.003	**R-squared**	0.399
FE	Firm & Year_Month	**FE**	Firm & Year_Month

*Note: Standard error display below coefficient number. *** p<0.01, ** p<0.05, * p<0.1*