Equity Exchange-Traded Funds and the Cost of Debt*

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Abstract

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Keywords: Equity ETFs; Bond yield spread; Disciplinary effect; Short interest.

JEL Classification: G12; G14

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Abstract

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1. Introduction

The evolving dynamics between passive and active investing have markedly transformed the asset management industry's landscape. Exchange-traded funds (ETFs), known for their high liquidity, low cost, and effective diversification, have expanded the array of investment, speculation, and hedging options available to investors.[1] As a pivotal instrument in passive investing, the ETF industry has experienced enormous growth over the past decade. Recent studies, including those by Fichtner, Heemskerk, and Garcia-Bernardo (2017) and Azar, Schmalz, and Tecu (2018), reveal that passive investors have become major shareholders in numerous firms.[2] By the end of 2020, ETFs managed assets exceeding $5.4 trillion, accounting for 18% of the net total assets of registered U.S. investment firms. Furthermore, ETFs contributed approximately 26% of the trading volume in the U.S. stock markets in 2020. Such rapid development has attracted huge attention from practitioners, researchers, and regulators, raising fundamentally important questions about the effects of ETFs on financial markets.[3] See, for example, Broman (2016), Ben-David, Franzoni, and Moussawi (2018), Da and Shive (2018), Lee (2018), Brown, Davies, and Ringgenberg (2021b), and Hao, Kim, Sul, and Wang (2019) on asset pricing and Boone and White (2015), Appel, Gormley, and Keim (2016, 2019), and Heath, Macciocchi, Michaely, and Ringgenberg (2022) on corporate governance.

Despite extensive research on the impact of ETFs, the effects of equity ETFs on a firm's

[1]The 2021 TrackInsight Global ETF Survey, jointly conducted by J.P. Morgan and leading ETF analysis platform TrackInsight, identifies the four most important attributes of ETFs for investors as low investment costs, trading ease or liquidity, simplicity, and diversification and risk management. As reported by the 2021 Investment Company Fact Book (ICI, 2021), the asset-weighted average expense ratio for equity ETFs in 2020 is 0.18%, in contrast to 0.5% for equity mutual funds.

[2]Azar et al. (2018) point out that the aggregate holdings of BlackRock, Vanguard, and State Street make them the largest investors for 88% of firms within the S&P500 index. According to the data retrieved from ETF.com, these three companies are also the top three ETF providers in the U.S. As of February 2021, BlackRock, Vanguard, and State Street managed ETF assets valued at $2137.59 billion, $1625.24 billion, and $886.07 billion, respectively.

[3]During a 2021 AFA annual conference talk, the founder and CEO of Citadel emphasized the important influence of ETFs on financial markets, in particular, the equilibrium between passive and active investing. Theoretical studies such as those by Bond and Garcia (2022) and Corum, Malenko, and Malenko (2020) delve into this issue.

cost of debt remain underexplored. As a measure of a firm's cost of debt, the bond yield spread that a firm pays when issuing debt is an important aspect of capital structures. Prior studies have investigated various factors influencing the cost of debt, including political rights and government ownership (Qi, Roth, and Wald, 2010; Borisova and Megginson, 2011; Borisova, Fotak, Holland, and Megginson, 2015), media coverage (Gao, Wang, Wang, Wu, and Dong, 2020), analyst and management forecast (Mansi, Maxwell, and Miller, 2011; Cao, Myers, Tsang, and Yang, 2017), equity cross-listing (Ball, Hail, and Vasvari, 2018), and international IFRS adoption (Florou and Kosi, 2015). However, the impact of financial market innovations, such as equity ETFs, on debt financing costs has received limited attention. This paper seeks to address this gap by examining the relationship between equity ETF ownership and corporate bond pricing.

The rationale for investigating the influence of financial market innovations like equity ETFs on the cost of debt is multi-faceted. Firstly, debt is an important and frequent source of external capital for many firms (Henderson, Jegadeesh, and Weisbach, 2006; Florou and Kosi, 2015), making it essential to understand the implications of equity ETFs' popularity on the debt market. Additionally, the bond market has traditionally been dominated by sophisticated institutional investors (Bessembinder, Kahle, Maxwell, and Xu, 2008; Mansi et al., 2011). As argued by previous studies, ETFs can enhance information incorporation and thus improve information efficiency. It is therefore interesting to explore how institutional investors react to the growing prominence of equity ETFs.

Moreover, the association between equity ETF ownership and the cost of debt is not obvious. Debt investors face information asymmetry when monitoring a firm's behavior, and the bond yield spread reflects this information risk. Theoretically, the effects imposed by equity ETF ownership on information asymmetry are ambiguous. On the one hand, many ETFs participate in the security lending market, increasing the lendable shares for short-sellers (Glosten, Nallareddy, and Zou, 2021), and facilitating synthetic shorting (Li and Zhu, 2022). Both enable the incorporation of negative information into stock prices in a more timely manner (Boehmer, Jones, and Zhang, 2008; Rapach, Ringgenberg, and Zhou, 2016), potentially disciplining managers and reducing the adverse effects of information asymmetry. This will influence firm value or risk. Merton (1974) states that bond contains a short put position on the underlying value of the firm. As a consequence, such a disciplinary effect might also affect the bond yield spread. Therefore a negative association between equity ETF ownership and bond yield spread is expected to be observed. On the other hand, some studies have documented a decline in internal governance following an increase in equity ETF ownership, which, in turn, exacerbates information asymmetry (Schmidt and Fahlenbrach, 2017; Heath et al., 2022). This could lead bond investors to demand a higher yield spread to compensate for the increased risk.

To address the above questions, we study the effects of equity ETF ownership on the cost of debt. We employ the bond offering yield spread in the primary market as a proxy for firms' cost of debt. Utilizing fixed-rate straight bond issuance data from 2008 to 2019, we document a negative association between equity ETF ownership and firms' cost of debt. Controlling for firm and bond issuance characteristics, the coefficient estimate of ETF ownership on the bond spread is statistically significant and economically meaningful. Specifically, after accounting for the effects of institutional ownership and index mutual fund ownership, a one standard deviation increase in equity ETF ownership leads to an 18 basis point reduction in the bond offering yield spread, which amounts to 6.5% of the average bond offering yield spread when the industry-by-year fixed effects are included in the regressions. The magnitude is comparable to that documented by Dannhauser (2017), which shows that a one standard deviation increase in bond ETF ownership reduces bond spreads by 20.3 and 9.2 basis points for high-yield and investment-grade bonds, respectively, in the secondary market. Overall, our results suggest that equity ETF ownership lowers the cost of debt, indicating an interaction between the equity and debt markets induced by ETFs.

We extend our analysis by examining whether the impact of equity ETF ownership on the cost of debt varies with firm characteristics. Our results reveal that the negative association is more pronounced in firms with weaker information environments and concentrates on junk-grade bonds. In this sense, our study complements those of Dannhauser (2017) and Glosten et al. (2021). Firms with limited information transparency and lower bond ratings typically face more severe information asymmetry, making them harder to monitor due to informational deficiencies.

We then move on to explore the channels through which equity ETF ownership affects the cost of debt. Many ETFs participate in share lending, thereby facilitating short-selling of underlying stocks by increasing lendable shares. For example, Glosten et al. (2021) document that firms with high equity ETF ownership have more lendable shares compared to others. Additionally, the security lending fee has become an important income source for many ETFs.[4] By facilitating the efficient integration of negative news into stock prices, equity ETFs exert a disciplinary effect and mitigate information asymmetry in financial markets.

To substantiate the short-selling channel, we conduct several tests.[5] First, we examine whether the negative association between equity ETF ownership and bond spread is more pronounced in firms with tighter short-sale constraints. Following prior studies, we use idiosyncratic volatility and Amihud illiquidity measure (Amihud, 2002) as proxies for short-sale constraints (Pontiff, 2006; Li and Zhu, 2022). We find that the negative relationship between equity ETF ownership and the cost of debt is more pronounced in firms with higher levels of idiosyncratic volatility and Amihud illiquidity. These results lend support to our hypotheses regarding the disciplinary effects of short-selling activities.

Second, we utilize our sample firms' earnings events to study the relationship between equity ETF ownership and short-selling activities. The motives of employing the setting of earnings announcements are twofold. On the one hand, the importance of financial statements has received huge attention from financial market participants such as short-sellers

[4]According to the iShares Annual Report and iShares Securities Lending Report, the iShares Russell 2000 ETF lent out securities of 4.27 and 4.8 billion USD in 2016 and 2017, respectively, accounting for 16.86% and 12.60% of assets under management. The ratio of security lending income of iShares Russell 2000 ETF ranged from 0.15% to 0.21% during 2017-2020, figures close to the expense ratios charged to ETF investors.

[5]We acknowledge that unit investment trusts, a specific type of ETF, are not permitted to engage in securities lending. These ETFs are excluded from all relevant tests.

(Christophe, Ferri, and Angel, 2004) and analysts (Johnson, Kim, and So, 2019). On the other hand, there is a relatively clear rule to evaluate the performance of firms by checking whether firms meet/beat the market's expectation. Following Livnat and Mendenhall (2006) and Huang, O'Hara, and Zhong (2021), we use standardized unexpected earnings (SUE) as a measure of earnings surprises and employ the abnormal short interest from Karpoff and Lou (2010) to gauge short-selling activity. We find that firms with higher equity ETF ownership experience a more significant increase in abnormal short interest following negative earnings surprises. This suggests that equity ETFs facilitate more accessible short-selling markets, particularly during negative earnings events, further establishing the relevance of the short-selling channel. By enabling short-sellers to quickly integrate negative information into stock prices, equity ETFs exert a disciplinary effect and reduce the cost of debt. This finding aligns with Huang et al. (2021), which shows that ETFs enhance the informational efficiency of firm-specific components.

Third, we explore the relationship between equity ETF ownership and short-selling activities in a subsample segmented by credit rating. Consistent with our previous findings that the negative association between equity ETF ownership and the cost of debt is more pronounced in junk-grade bonds, we observe that only these junk-grade bonds with higher equity ETF ownership experience a significant increase in abnormal short interest during negative earnings surprises. This supports the notion of a disciplinary effect of short-selling induced by equity ETF ownership.

Further, we employ several approaches to address potential endogeneity concerns. First, we include industry-by-year fixed effects to control for time-varying industry factors that could bias our results. For example, the creation of sector/industry ETFs targeting promising industries with typically lower debt costs might introduce a spurious correlation between ETF ownership and the cost of debt. Our results still hold in this more stringent specification. Second, we leverage BlackRock's 2009 acquisition of iShares ETF from Barclays Global Investors as an exogenous shock to ETF ownership. As demonstrated by Antoniou, Li, Liu, Subrahmanyam, and Sun (2022) and Zou (2019), this acquisition led to an exogenous increase in ETF ownership for stocks with higher iShares ETF ownership, which stems from the branding and scale benefits and distribution channels of BlackRock. We utilize a four-year window and an instrumental variable (IV) model to re-examine the effect of ETF ownership on bond pricing. Our findings suggest a causal relationship between equity ETF ownership and a reduced bond offering yield spread. Finally, we conduct several robustness tests using different samples and alternative measures of ETF ownership, and our results remain consistent.

Our study is closely related to Dannhauser (2017), which investigates the impact of bond ETFs on bond pricing in the secondary market and establishes a negative relation between bond ETF ownership and bond spreads. However, our research differs in several key aspects. First, due to differences in voting rights, the disciplinary effect of short-selling is more pertinent in the equity market than in the corporate bond market. We examine the distinct roles of ETFs in financial markets and identify various channels through which they influence a company's bonds. Unlike Dannhauser (2017), which focuses on the responsiveness of corporate bond prices to bond ETFs, our study examines the disciplinary effect of short-selling facilitated by equity ETFs—a phenomenon unique to the equity ETF market and absent in the bond ETF market. Second, our focus is on the impact of equity ETF ownership on the cost of debt in the primary bond market, in contrast to Dannhauser (2017)'s examination of price dynamics in the secondary bond market. Third, the size of equity ETFs is considerably larger than that of bond ETFs. In the US market, equity ETFs managed assets exceeding 5 trillion U.S. dollars at the end of 2020, compared to 1.2 trillion U.S. dollars for bond ETFs.

Our paper contributes to the current literature in several ways. First, our study adds to the ongoing research on the influence of ETFs in financial markets, responding to calls by Lettau and Madhavan (2018) and the Securities and Exchange Commission (SEC) for more comprehensive studies to deepen our understanding of ETFs' impacts.[6] Second, we identify

[6]For more details, please refer to https://www.sec.gov/news/speech/speech-piwowar-2017-09-08.

equity ETF ownership as a new factor influencing the cost of debt. Specifically, we extend the literature by associating financial market innovations, such as equity ETFs, with the cost of debt. As financial markets evolve and innovations emerge, it is important to evaluate the effect of innovations on the cost of debt, given the importance of the cost of debt in the previous theoretical and empirical literature (Valta, 2012; Borisova et al., 2015; Gao et al., 2020). Third, we highlight the importance of equity ETFs in facilitating short-sellers to discipline firms. The enhancement in external monitoring from short-sellers facilitated by ETFs mitigates concerns about the potential weakening of internal monitoring by passive ETF shareholders (Heath et al., 2022). Fourth, this research bridges equity ETFs with bond pricing, contributing to the body of work examining the interplay between equity and bond markets (Gebhardt, Hvidkjaer, and Swaminathan, 2005; Even-Tov, 2017).

The remainder of the paper is structured as follows: Section 2 reviews the related literature; Section 3 details the sample and variables construction; Section 4 presents our findings; Section 5 explores the mechanisms through which equity ETF ownership affects bond pricing; Section 6 addresses endogeneity concerns and conducts several robustness checks; and Section 7 concludes the paper.

2. Related Literature

Our paper relates to the extensive literature on the effects of equity ETFs, encompassing diverse topics such as asset pricing, corporate governance, the real effects of financial markets, and market microstructure. The existing research presents mixed findings, with some studies documenting positive impacts and others indicating negative effects of equity ETFs.

On the positive side, numerous studies underscore the benefits of equity ETFs. First, they facilitate the incorporation of systematic and industry information, enhancing the liquidity of underlying securities. Prior studies show that equity ETFs aid in transferring industry information (Bhojraj, Mohanram, and Zhang, 2020), timely incorporating systematic information during earnings announcements (Glosten et al., 2021), elevating factor information in prices (Cong and Xu, 2019), and facilitating managers in learning from stock market dynamics (Antoniou et al., 2022). Consequently, liquidity will increase during the process of information transmission and ETF arbitrage (Boehmer and Boehmer, 2003; Hamm, 2014; Saglam, Tuzun, and Wermers, 2019). A recent study by Huang et al. (2021) shows that equity ETFs can enhance the informational efficiency of firm-specific components. Second, equity ETFs facilitate short-selling activities by increasing lendable shares (Glosten et al., 2021; Karmaziene and Sokolovski, 2015), enabling synthetic and operational shorting (Evans, Moussawi, Pagano, and Sedunov, 2019; Li and Zhu, 2022), and increasing the probability of industry hedging through sector ETFs shorting (Huang et al., 2021). Third, the passive management style of equity ETFs, characterized by a long-term investment horizon and limited exit options, is found to improve corporate governance (Appel et al., 2016, 2019), enhance firm transparency (Boone and White, 2015), and reduce misconduct (Baig, DeLisle, and Zaynutdinova, 2018).

Conversely, some studies demonstrate the negative impacts of equity ETFs. First, equity ETFs could transit non-fundamental shocks to their underlying securities, increasing volatility and leading to excessive co-movement and contagion effects (Krause, Ehsani, and Lien, 2014; Ben-David et al., 2018; Da and Shive, 2018; Iwadate, 2021). Broman (2016) and Bhattacharya and O'Hara (2018) show that equity ETFs attract more short-term noise traders and speculators, while Israeli, Lee, and Sridharan (2017) find a decrease in the pricing efficiency of underlying securities. Second, the passive investment nature of equity ETFs is also criticized for diminishing investor incentives to monitor underlying firms, leading to increased CEO power, fewer independent directors (Schmidt and Fahlenbrach, 2017), less possibility of voting against a firm's management (Heath et al., 2022), and more low-quality share repurchases to beat or meet the analysts' forecasts (Bratten, Huang, and Payne, 2020). Third, the evolving complexity of the ETF industry may disadvantage unsophisticated investors, increasing their irrational behaviors (Brown, Cederburg, and Towner, 2021a; Gao, Hu, Kelly, Peng, and Zhu, 2021).

Recent studies also explore the effects of bond ETFs, primarily focusing on asset pricing. Dannhauser (2017) documents a negative association between bond ETFs and bond spread in the secondary market. Hao et al. (2019) find the bond ETF returns lead to the price discovery of constituent bonds. Pan and Zeng (2019) explore the role of authorized participants in bond ETF markets, noting their impact on price discovery and persistent mispricing. Ye (2018) demonstrates that bond ETFs enhance the liquidity of underlying bonds, while Lee (2018) reports mixed effects on liquidity across different bond types.

Our paper is also related to studies on the cost of debt. Previous studies identify factors that influence the cost of debt, including political rights, government ownership, media coverage, analyst and management forecasts, and international reporting standards. Qi et al. (2010) highlights the role of political rights in global corporate bond markets, Borisova and Megginson (2011) and Borisova et al. (2015) examine the impact of government ownership, Gao et al. (2020) explore the influence of media coverage, and Mansi et al. (2011) and Cao et al. (2017) focus on the effects of forecasts from analysts and managers. Additionally, the literature suggests that mandatory IFRS adoption (Florou and Kosi, 2015) and U.S. cross-listing (Ball et al., 2018) can reduce the cost of debt.

3. Sample and Variables Construction

In this section, we describe the construction of the sample and the calculation of the variables for our empirical analysis. Specifically, we discuss how to compute bond offering yield spread, equity ETF ownership, abnormal short interest (ABSI), standardized unexpected earnings (SUE), and other control variables. We present the summary statistics at the end of this section.

3.1. *Sample and data sources*

We compile the list of U.S. domestic equity ETFs using the following procedures. First, we merge the CRSP stock database (share code equals 73) with the CRSP Survivor-Bias-Free Mutual Fund database (ETF flag equals F). We restrict our sample to U.S. domestic equity ETFs by using the first two digits of the CRSP style code of "E.D." (equity domestic). We exclude ETFs involved in hedged positions, short positions, and options trading, and filter out ETFs with names containing "bear", "hedged", and "bond". Importantly, we also exclude unit investment trusts from our sample, as they are not allowed to participate in security lending, a key channel in our proposed framework. Finally, we use the MFLINKS table to merge the ETF data with ETF holdings from the Refinitiv Mutual Fund Holding database (S12). The final sample consists of 626 ETFs, a size comparable to recent studies such as those by Antoniou et al. (2022) and Glosten et al. (2021).

We then collect bond issuance information from the Refinitiv Securities Data Company (SDC) database.[7] In line with previous studies such as Gao et al. (2020), we exclude bonds with callable, putable, convertible, and exchangeable features to mitigate the influence of embedded options. Our primary focus is on fixed-rate straight bonds issued in the U.S. primary bond market by publicly traded companies. In the main analysis, we also exclude financial and utility firms because bonds issued by those firms behave differently (Gao et al., 2020).[8]

We retrieve the Treasury spot rates information from the Federal Reserve Board. Stock returns and accounting information are obtained from CRSP and Compustat databases. We consider stocks traded on the NYSE, AMEX, and NASDAQ with share codes 10 or 11. We obtain the short interest data from Compustat Supplement Short Interest File, and analyst-related information from Institutional Brokers' Estimate System (IBES). To mitigate

[7]Following its acquisition by Blackstone in 2018, the Thomson Reuters Financial & Risk unit was renamed Refinitv. Some databases involved are referred to as both Thomson Reuters and Refinitv. To maintain consistency, we refer to it as Refinitiv throughout this paper.

[8]For robustness, we include firms across all industries in a subsequent analysis in Section 6.2.

the potential confounding effects of the Regulation SHO Pilot Program and the COVID-19 pandemic, our sample period begins in 2008 and concludes in 2019.[9]

3.2. Key variables

3.2.1. Bond offering yield spread

Following Gao et al. (2020), we use the offering yield spread of corporate bonds as a proxy for the firms' cost of debt, which is calculated as the offering yield minus the synthetic risk-free yield. To calculate the synthetic risk-free yield, we first construct the complete Treasury yield curve using the Treasury spot rates from the Federal Reserve Board, following the method of Gürkaynak, Sack, and Wright (2007). We then compute the price of a synthetic risk-free bond, matching the maturity, coupons, and principals of each corporate bond in our sample. Using the price of the synthetic risk-free bond obtained in the previous step, we back out the yield to maturity of such synthetic risk-free bond. Finally, the bond offering yield spread is defined as the difference between the offering yield minus the synthetic risk-free yield.

3.2.2. Equity ETF ownership

The firm-level equity ETF ownership is calculated as the ratio of shares held by U.S. domestic equity ETFs to the total shares outstanding at the end of each quarter,

$$ETF_{i,t} = \frac{\Sigma_{j \in J} Shares_{i,j,t}}{shares\ outstanding_{i,t}}, \quad (1)$$

where J is the set of ETFs holding firm $i's$ stock, and $Shares_{i,j,t}$ is the number of shares of firm i held by ETF j at the end of quarter t.

[9] The Regulation SHO Pilot Program, which ran from May 2, 2005, to April 28, 2006, temporarily reduced short-selling constraints for a random sample of firms to evaluate the impact of short-selling activities.

3.2.3. Abnormal short interest

We adopt the approach of Karpoff and Lou (2010) to calculate abnormal short interest ($ABSI$) as follows:

$$ABSI_{i,t} = SI_{i,t} - ESI_{i,t}. \tag{2}$$

In Equation (2), $SI_{i,t}$ is the raw short interest of firm i at time t, which is firm's shorted shares scaled by its shares outstanding. $ESI_{i,t}$ is the expected short interest of firm i at time t, which is calculated as the fitted value from a monthly cross-sectional regression. To run the regression, in each month we independently classify stocks into three groups by size, book-to-market ratio, and momentum. As a result, each stock is assigned to one of the 27 ($3 \times 3 \times 3$) constructed portfolios. We further put each stock into industry groups based on the Fama-French 48 industry classifications. Then we run the following regression in each month,

$$SI_{i,t} = \sum_{g=low}^{medium} s_{g,t}Size_{i,g,t} + \sum_{g=low}^{medium} b_{g,t}BTM_{i,g,t} + \sum_{g=low}^{medium} m_{g,t}Mom_{i,g,t} + \sum_{k=1}^{48} \phi_{k,t}Ind_{i,k,t} + u_{i,t}. \tag{3}$$

The first three sets of independent variables are dummy variables that collectively determine the 27 size, book-to-market, and momentum portfolios. For example, if firm i is sorted into the lowest book-to-market portfolio in month t, then $BTM_{i,low,t} = 1$ and $BTM_{i,medium,t} = 0$. Industry dummy $Ind_{i,k,t}$ equals 1 if firm i is classified into industry k in month t. The fitted value $ESI_{i,t}$ is calculated using the monthly updated coefficients.

3.2.4. Standardized unexpected earnings

We follow Livnat and Mendenhall (2006) and Huang et al. (2021) in defining earnings surprises as standardized unexpected earnings (SUE), which is calculated as the difference between the actual and expected earnings per share (EPS), scaled by stock prices. We employ two proxies for expected EPS: i) stock analysts' median estimates of EPS and ii) stock analysts' mean estimates of EPS. The two SUEs are denoted by $SUE - Median\ Analyst$

and $SUE - Mean\ Analyst$, respectively. We apply standard filters used by previous studies, requiring firms to have positive quarterly sales and assets, and excluding firms with stock prices below $1 and market capitalizations below $5 million (Livnat and Mendenhall, 2006). We require the earnings announcement date is not missing in Compustat. If there is a discrepancy in the earnings announcement dates recorded in Compustat and IBES, we stipulate that the difference between the two sources should not exceed one calendar day, and we set the earnings announcement date as the earlier of the two dates. For our calculations, we utilize the last EPS estimate issued 90 days prior to the earnings announcement.

3.3. Control variables

We include three sets of control variables in our regression analysis. The first set consists of firm characteristics. As demonstrated by Mansi et al. (2011) and Ball et al. (2018), larger and more mature firms with a robust information environment often receive more favorable financing conditions. We use firm size (*Size*) and age (*Age*) as proxies for these aspects. In addition, we use the leverage ratio (*Leverage*) to measure financial risk (Collin-Dufresne and Goldstein, 2001; Eom, Helwege, and Huang, 2004). In line with Kogan and Papanikolaou (2014), we control for the firm's future growth opportunities using the book-to-market ratio (BTM). We also include return on assets (ROA) to account for operating performance (Core, Guay, and Rusticus, 2006). Following Glosten et al. (2021), we include institutional ownership (IO) and index mutual fund ownership ($Index$) into the regression to account for the impact of other investors.

The second category of variables includes stock returns (*Return*) and stock return volatility ($Volatility$), measuring the risk and returns of firms (Campbell and Taksler, 2003). The third group pertains to bond offering information, including issue size ($Issue\ size$), issue maturity ($Issue\ maturity$), and credit ratings (*Rating*). We primarily rely on Moody's ratings, supplementing with Standard & Poor's ratings when necessary. We define each variable as follows:

- *Size*: the natural log of market capitalization;
- *Age*: the number of years since the firm's IPO date;
- *Leverage*: the total liabilities divided by total assets;
- *BTM*: the book value of equity divided by the market value of equity;
- *ROA*: operating income before depreciation divided by total assets;
- *IO*: the residual from regressing total institutional ownership on ETF ownership;
- *Index*: the residual from regressing index mutual fund ownership on ETF ownership;
- *Return*: the average daily stock returns over the past year;
- *Volatility*: the standard deviation of daily stock returns over the past year;
- *Issue size*: the natural log of total proceeds from bond issuance;
- *Issue maturity*: the natural log of bond maturity;
- *Rating*: we follow Blume, Lim, and MacKinlay (1998) and convert the original rating system to a numerical scale ranging from zero(AAA bonds) to twenty (C bonds).

3.4. Summary statistics

Table 1 presents the descriptive statistics of the main variables used in our empirical analysis. The average bond offering yield spread is 2.8% in our sample. Figure 1 illustrates the yearly trend of offering yield spread from 2008 to 2019, highlighting a general decrease except during the Global Financial Crisis (GFC) period, when it spiked to over 6%.

[Insert Table 1 about here.]

[Insert Figure 1 about here.]

The average equity ETF ownership is 4.8%, with a standard deviation of 2.9%. Figure 2 displays an increasing pattern of equity ETF ownership, indicating significant growth in the ETF sector over the past decade.

[Insert Figure 2 about here.]

We also present summary statistics for firm and bond characteristics related to bond pricing, including firm size, age, leverage, BTM, ROA, IO, Index, return, volatility, issue size, issue maturity, and credit rating. The sample firms are generally larger, aligning with previous findings that firms with publicly traded debt tend to be more substantial (Mansi et al., 2011; Florou and Kosi, 2015). Additionally, firms in our sample exhibit high profitability, with an average ROA of 15.6%, and good growth opportunities, with an average BTM of 0.50.[10] On average, the bond offering proceeds are 1.15 billion, the bond maturity is 10.27 years, and the mean bond rating is 8.24, corresponding to a rating of Baa2 in Moody's rating system.

4. Empirical Results

This section presents our main empirical results on the association between equity ETF ownership and firms' cost of debt. We begin with the baseline regressions and then extend our analysis by examining whether the impact of equity ETF ownership on the cost of debt varies with firm and bond attributes.

4.1. Baseline results

To examine whether a firm's equity ETF ownership affects its cost of debt, we run the following regression,

$$Bond\ spread_{k,i,t} = \beta_0 + \beta_1 ETF_{i,t-1} + \psi' Controls_{t-1} + \epsilon_{k,i,t}, \tag{4}$$

where $Bond\ spread_{k,i,t}$ is the offering yield spread of bond k issued by firm i in quarter t, $ETF_{i,t-1}$ is the lagged equity ETF ownership of firm i, and $Controls_{t-1}$ contains lagged control variables including firm size, firm age, leverage ratio, book-to-market ratio, return

[10]For comparison, the average firm size, ROA, and BTM for the common equities in the CRSP and Compustat universe during the same sample period are 19.988, 1.9%, and 0.827, respectively.

on assets, residual institutional ownership, residual index mutual fund ownership, return volatility, stock returns, bond issuing size, issuing maturity, and bond rating. In addition, we control for the Fama-French 48 industry and year fixed effects and cluster standard errors at the firm level.

Table 2 reports the baseline regression results using the specification in Equation (4). Columns (1)-(3) use different sets of control variables. Firm characteristics are included in column (1), with stock returns and return volatility added in column (2). Column (3) adds controls for issuance-related variables.

[Insert Table 2 about here.]

Across all specifications, we find a statistically negative coefficient estimate of ETF, indicating that higher ETF ownership is associated with lower borrowing costs for firms. The coefficient estimate of β_1 in column (3) is -0.069 and significant at the 1% level. It implies that a one standard deviation increase in equity ETF ownership leads to a 20 basis points decrease in the offering yield spread (0.029×-0.069), which is 7.1% of the average bond spread and economically meaningful. This magnitude is comparable with the one documented by Dannhauser (2017), which shows a one standard deviation increase of the bond ETF ownership reduces the bond spreads by 20.3 and 9.2 basis points for high-yield and investment-grade bonds, respectively, in the secondary bond market. Moreover, our results exhibit a more pronounced effect than Gao et al. (2020), which reports a 14.4 basis point decrease in offering yield spread per additional unit of media coverage.

In columns (1) to (3), we include industry-level fixed effects to control for industry-specific unobserved heterogeneity. However, the creation of sector/industry ETFs targeting promising industries with typically lower debt costs might introduce a spurious correlation between ETF ownership and the cost of debt. To control for the time-varying industry confounding effect that might bias our results, we include industry-by-year fixed effects in the regressions, with results presented in column (4). We continue to find a significant and negative relationship between equity ETF ownership and the cost of debt after controlling for industry-by-year fixed effects. A one standard deviation increase in equity ETF ownership is associated with an 18 basis points reduction in the offering yield spread (0.029×-0.063), which is 6.5% of the average bond spread. The magnitude is still economically meaningful in this more stringent specification.

The other control variables have the expected signs. For example, bond offering yield spreads are lower for firms that are larger and with high institutional ownership. These findings are consistent with the corporate finance literature. Bond spreads are positively related to stock return volatility, which is consistent with the prediction by Campbell and Taksler (2003). We also find that yield spreads are higher for bonds with larger issuance proceeds, longer maturities, and inferior credit ratings.

Overall, our results support a negative association between equity ETF ownership and firms' cost of debt. The finding provides evidence on the beneficial impact of equity ETFs, which complements several recent studies documenting the positive effects of ETFs (see, e.g., Antoniou, Li, Liu, Subrahmanyam, and Sun, 2022; Glosten, Nallareddy, and Zou, 2021).

4.2. Cross-sectional analysis

In this section, we conduct two cross-sectional analyses to examine the differential impacts of equity ETF ownership on firms' borrowing costs. Specifically, we explore whether the impact of ETF ownership is related to firms' information environments and credit ratings.

Glosten et al. (2021) show that the beneficial effects of equity ETF ownership on facilitating the incorporation of systematic earnings information are more pronounced for firms with weaker information environments. Dannhauser (2017) demonstrates differing impacts of bond ETF ownership on yield spreads across investment-grade and junk-grade bonds. Inspired by Glosten et al. (2021) and Dannhauser (2017), we explore whether the effects of equity ETF ownership on bond spreads vary with information environments and bond credit ratings by including interaction terms between ETF ownership and proxies for information environments and credit ratings in our regressions.

Following Glosten et al. (2021), we use firm size and the number of analysts following as proxies for information environments. To facilitate interpretation, we construct the firm size variable, *Size decile*, categorizing firms into deciles based on market capitalization prior to bond issuance, with smaller firms (weaker information environments) assigned higher decile values. Since smaller firms tend to have weaker information environments, higher values of *Size decile* indicate weaker information environments. Similarly, we calculate the analyst number variable, *Analyst decile*, based on the number of analysts following a firm in the quarter before the bond offering date. Specifically, firms with the least analyst coverage (bottom 10%) are assigned a value of ten, whereas firms with the most analyst coverage (top 10%) are assigned a value of one. Given that firms with fewer analysts following tend to have weaker information environments, higher values of *Analyst decile* indicate weaker information environments. For credit rating, we employ a dummy variable, *Junk dummy*, which is assigned a value of one for bonds rated below BBB and zero otherwise.

The regression models are as follows:

$$Bond\ spread_{k,i,t} = \beta_0 + \beta_1 ETF_{i,t-1} + \beta_2 X_{i,t-1} + \beta_3 ETF_{i,t-1} \times X_{i,t-1} + \psi' Controls_{t-1} + \epsilon_{k,i,t}, \quad (5)$$

where $X_{i,t-1}$ denotes the information environment or credit rating variables. That is, $X_{i,t-1} = Size\ decile_{i,t-1}$, $Analyst\ decile_{i,t-1}$, or $Junk\ dummy_{i,t-1}$. Similar to Equation (4), we control for the Fama-French 48 industry and year fixed effects (or industry-by-year fixed effects) and cluster standard errors at the firm level.

We present the regression results in Table 3. The coefficient on the interaction term $ETF \times Size\ decile$ is -0.022 and significant at the 1% level in column (1), indicating that the negative relationship between equity ETF ownership and the cost of debt is stronger for smaller firms with weaker information environments. Similarly, as shown in columns (3) and (4), the coefficient of $ETF \times Analyst\ decile$ is significantly negative, suggesting a stronger effect of ETF ownership for firms with limited analyst coverage. The negative coefficient estimates of the interaction terms imply that the negative association between equity ETF ownership and bond spreads is more pronounced for firms with weak information environments. Columns (5)-(6) present results on the credit rating. The coefficient of the interaction term $ETF \times Junk\ dummy$ is negatively significant in both specifications. This suggests the decrease in bond spread induced by ETF ownership concentrates on junk-grade bonds.

[Insert Table 3 about here.]

Collectively, the results of cross-sectional tests show that the negative association between equity ETF ownership and bond spreads is more pronounced for firms with weaker information environments and concentrates on junk-grade bonds.

5. Channel Analysis

In this section, we explore the potential mechanisms through which equity ETF ownership may affect a firm's cost of debt, particularly focusing on the disciplinary effects of short-selling activities that are facilitated by equity ETFs.[11]

5.1. Relevance of the short selling channel

A significant number of equity ETFs participate in the security lending market. By providing easier access to short-selling, equity ETFs enable short-sellers to leverage their information advantage and incorporate negative news into stock prices efficiently. Karpoff and Lou (2010) demonstrate a disciplinary effect brought by short-selling activities, which reduces earnings manipulations and other forms of corporate misconduct. Consequently, a lower bond yield spread for firms with higher equity ETF ownership is expected to be observed.[12]

[11]Previous studies have documented that passive index ownership can improve corporate governance (Boone and White, 2015; Appel et al., 2016, 2019), potentially leading to reduced debt costs (Bhojraj and Sengupta, 2003; Anderson, Mansi, and Reeb, 2004; Klock, Mansi, and Maxwell, 2005). However, corporate governance usually changes slowly, which is difficult to assess within the relatively short time period as in our study.

[12]To ensure the relevance of our analysis, we limit our focus to firms included in our baseline regression.

We conduct three tests to examine the disciplinary channel through which ETF ownership operates to impact bond pricing. First, we test whether the effect of equity ETF ownership is stronger for firms that are subject to greater limits to arbitrage. Given that equity ETFs actively engage in securities lending, they can significantly alleviate arbitrage constraints. If the disciplinary effect of short-selling is indeed a primary driver behind our findings, then the influence of equity ETF ownership should be more pronounced in firms with greater arbitrage limitations. Second, we employ negative earnings surprise events to analyze whether firms with higher equity ETF ownership have a more active short-selling market. Third, we explore whether the association between equity ETF ownership and short-selling activities during negative earnings surprise events varies between junk-grade and investment-grade bonds.

5.2. Limits to arbitrage

Pontiff (2006) and Hong, Li, Ni, Scheinkman, and Yan (2015) show that short-selling activities are less prevalent in more volatile and illiquid stocks due to higher arbitrage costs. Following Pontiff (2006) and Li and Zhu (2022), we use two proxies to measure short-sale constraints. The first is idiosyncratic volatility, which is the standard deviation of the residuals from regressing monthly stock returns against the Fama-French three-factor (Fama and French, 1993) using data from the past five years. We sort all firms into deciles according to their idiosyncratic volatility levels. Then we construct a decile variable, $Idiosyncratic\ decile$, where firms with the highest idiosyncratic volatility are assigned a value of ten, while those with the lowest volatility are assigned a value of one. The second measure is the Amihud illiquidity decile variable, *Amihud decile*, calculated based on the decile of Amihud illiquidity measure to which a firm belongs before the bond issuing date. Firms in the top 10% of the Amihud illiquidity measure group (least liquid) receive a value of ten, and those in the bottom 10% (most liquid) receive a value of one. In our regression analysis, we adapt the specification of Equation (5), substituting $X_{i,t-1}$ with $Idiosyncratic\ decile_{i,t-1}$ or $Amihud\ decile_{i,t-1}$. We conjecture that the interaction terms $ETF \times Idiosyncratic\ decile$

and $ETF \times Amihud\ decile$ will exhibit negative coefficients, indicating a stronger effect of ETF ownership for firms facing tighter short-sale constraints.

[Insert Table 4 about here.]

Table 4 presents the regression results. In columns (1) and (2), we use the idiosyncratic volatility as a proxy for short-sale constraints. The coefficient of $ETF \times idiosyncratic\ decile$ is -0.012 and significant at the 5% level in column (1), implying a more pronounced effect of ETF ownership for firms with higher idiosyncratic volatility. As reported in columns (3) and (4), the coefficient for $ETF \times Amihud\ decile$ is negatively significant in both specifications. This result indicates a larger decline in the cost of debt for less liquid firms. Collectively, our results show that the effects of equity ETF ownership on reducing the cost of debt are more pronounced for firms with greater arbitrage challenges, in line with the findings of Li and Zhu (2022).

5.3. *News and short interest*

The above analysis on limits to arbitrage indirectly supports that equity ETF ownership might ease short-sale constraints for firms facing greater limits to arbitrage. A more direct test is to explore the relationship between equity ETF ownership and short interests. Glosten et al. (2021) show that firms with greater equity ETF ownership have higher lendable shares.[13] Different from Glosten et al. (2021), we study short interest that is the outcome of both supply and demand. Specifically, we conduct an event study to explore the change in short interests around earnings announcements, using the following specification:

$$ABSI_{i,t} = \beta_0 + \beta_1 ETF_{i,t-1} + \beta_2 SUE\ decile_{i,t} + \beta_3 ETF_{i,t-1} \times SUE\ decile_{i,t} + \psi' Controls_{t-1} + \epsilon_{i,t}, \quad (6)$$

where $ABSI_{i,t}$ is the abnormal short interest of firm i in quarter t. $SUE\ decile_{i,t}$ is the SUE decile variable constructed using SUE for firm i in quarter. To construct $SUE\ decile_{i,t}$, we

[13]In an untabulated analysis, we explore the relationship between equity ETF ownership and abnormal short interests. Our results show that the short interests of stocks increase with their corresponding ETF ownership.

sort firms into deciles by their $SUE - Median\ Analyst$ or $SUE - Mean\ Analyst$. Firms in the top group of $SUE-Median\ Analyst$ or $SUE-Mean\ Analyst$ are assigned a value of one, whereas firms in the bottom group are assigned a value of ten. We construct $SUE\ decile_{i,t}$ for negative and positive SUE, respectively. Since short-sellers have an information advantage and might establish their positions before the release of quarterly earnings, we use the latest ABSI information before the earnings announcement as the dependent variable. We control for the Fama-French 48 industry and year fixed effects (or industry-by-year fixed effects) and cluster standard errors at the firm level.

Table 5 presents the findings. Columns (1)-(4) focus on negative earnings surprise events, while columns (5)-(8) concentrate on positive earnings surprise events. As shown in columns (1)-(4), the coefficient estimates of the interaction term between ETF ownership and $SUE\ decile$ are positively significant across various specifications. The results support our conjecture that short interests increase more significantly for firms with higher equity ETF ownership during negative earnings surprises events. However, the coefficient estimates of the interaction term are not significant for positive earnings surprises events, suggesting that short-selling activities facilitated by ETFs are less pertinent when firms perform well. Equity ETFs facilitate an active short-selling market around negative announcements, which enhances the external monitoring for firms to exert a disciplinary effect.

[Insert Table 5 about here.]

5.4. Subsample analysis based on credit ratings

If short selling is one channel through which equity ETFs affect the cost of debt, we conjecture that the role of equity ETFs in facilitating an active short-selling market around negative announcements would be more pronounced for junk-grade bonds. To investigate this, we conduct an event study examining the change in short interests around earnings announcements, differentiating between junk-grade and investment-grade bond groups. A firm is classified as junk-grade group if it has issued at least one junk-grade bond in our baseline sample. In particular, we run the regressions of Equation (6) for junk-grade and investment-grade groups, respectively.

[Insert Table 6 about here.]

Table 6 presents the findings from this analysis. Panel A (B) reports the results of negative (positive) earnings surprises events. In Panel A, the interaction term between equity ETF ownership and SUE decile is positively significant for junk-grade bonds (columns (1) to (4)). However, this significance is not observed for investment-grade bonds. In Panel B, the results are negative and weakly significant for junk-grade bonds only. This means their abnormal short interests decrease significantly around positive SUE events. This is also possibly due to a more active short-selling market for junk-grade bonds. The results continue to be insignificant for investment-grade bonds. These results lend support to our conjecture that the facilitation of an active short-selling market by equity ETFs is more concentrated in bonds with lower credit ratings.

6. Endogeneity and Robustness Checks

In this section, we address potential endogeneity concerns and perform several robustness checks to validate our findings.

6.1. Endogeneity

First, to mitigate the potential bias from time-varying industry effects, we have included industry-by-year fixed effects in the regressions, as reported in Tables 2 to 6. Furthermore, there is a possibility that ETF ownership correlates with unobserved firm characteristics influencing bond pricing. To address this concern, we adopt the approach used by Antoniou et al. (2022) and Zou (2019), utilizing BlackRock's acquisition of iShares ETF from Barclays Global Investors at the end of 2009 as an exogenous shock to ETF ownership. After the global financial crisis (GFC), Barclays sold iShares ETFs to BlackRock to strengthen its balance sheet and avoid a possible bailout by the UK government. The acquisition increased the asset holdings of BlackRock by 37% and strengthened BlackRock's leading position in the ETF industry (Zou, 2019). Antoniou et al. (2022) and Zou (2019) show that, due to the branding and scale benefits and distribution channels of BlackRock, there has been an exogenous increase in ETF ownership for stocks with higher iShares ETF ownership relative to those stocks with lower iShares ETF ownership since the acquisition of iShares ETFs by BlackRock. The asset management value under iShares ETFs surged by 19% one year post-acquisition. This acquisition essentially induced an exogenous change in equity ETF ownership, which is not relevant to firm characteristics but is caused by the influence of BlackRock.

As the acquisition was completed by the end of 2009, we use a four-year window around 2009, covering from 2008 to 2011. Following Antoniou et al. (2022), firms in the top 30% of the iShares ETF ownership averaged over 2008 and 2009 are designated as the treatment group ($Treat = 1$), with the remainder as the control group ($Treat = 0$).[14] The indicator variable $Post$ is one for 2010 and 2011, and zero otherwise.

[Insert Table 7 about here.]

We follow Antoniou et al. (2022) and estimate the IV model jointly using the two-stage least-squares (2SLS) method to explore the effects of ETF ownership on the cost of debt. The first and second stage of regressions are specified in Equation (7),

$$\begin{aligned} ETF_{i,t} &= \beta_0 + \beta_1 Treat_i * Post_t + \psi' Controls_{t-1} + \epsilon_{i,t}, \\ Bond\ spread_{k,i,t} &= \beta_0 + \beta_1 ETF(fitted)_{i,t-1} + \psi' Controls_{t-1} + \epsilon_{k,i,t}. \end{aligned} \tag{7}$$

[14] We use this approach to induce more variation in the $Treat$, as most of the firms in our sample have some ownership by iShares ETF. In each year, the iShares ETF ownership is a firm-level ratio defined as the shares owned by iShares ETF normalized by the shares outstanding. We calculate the mean of the iShares ETF ownership in 2008 and 2009 and rank firms accordingly.

Our variable of interest is the coefficient of the fitted ETF ($ETF(fitted)$) in the second stage. We present the results of the IV regressions in Table 7. In the first stage (columns (1) and (3)), we find a significantly positive relationship between our instrument variable ($Treat \times Post$) and equity ETF ownership, indicating that the instrument variable meets the relevancy criteria. The exclusion criteria of IV is also likely to be met as the BlackRock's acquisition of iShares ETF is unlikely driven by fundamental characteristics of stocks with higher iShares ETF ownership. In the second stage, we regress the offering yield spread on the fitted value of equity ETF ownership ($ETF(fitted)$) obtained from the first stage to re-examine the effect of ETF ownership on the bond pricing. As reported in columns (2) and (4), we continue to find a negative association between ETF ownership and the cost of debt, consistent with the main results.

6.2. Robustness tests

We conduct two robustness tests to investigate whether our results are robust to a different sample and an alternative definition of ETF ownership. Given the unique characteristics of the financial and utility industries, we follow Gao et al. (2020) and do not include them in our primary regressions. As a robustness check, we include the financial and utility industries in the regressions. Additionally, we follow Antoniou et al. (2022) in using the number of ETFs holding the stock, $Number\ of\ ETFs$, as an alternative measure of ETF ownership. $Number\ of\ ETFs$ is calculated using the natural log of one plus the number of ETFs holding a firm.

[Insert Table 8 about here.]

Table 8 reports the results of these robustness checks. Columns (1)-(2) present the results when including financial and utility industries. Our results still hold. Columns (3)-(4) report the results of using $Number\ of\ ETFs$ as the measure of ETF ownership. The coefficient of $Number\ of\ ETFs$ is statistically negative. These results indicate that our results continue to hold when employing a different sample or a different measure of ETF ownership.

7. Conclusion

The past decade has seen remarkable growth in the ETF industry, which is increasingly playing an important role due to its low cost, high liquidity, and effective diversification. Understanding the impact of ETF ownership on asset pricing and corporate governance is therefore crucial. This paper explores the influence of equity ETF ownership on the cost of debt in the primary bond market.

We document a negative association between equity ETF ownership and bond spreads. This negative association is more pronounced for firms with weaker information environments and concentrates on junk-grade bonds. We further explore the channels through which equity ETF ownership impacts bond pricing, identifying the disciplinary effect of short-selling facilitated by ETFs, as a key channel.

We address the issue of endogeneity from two aspects. First, by including the industry-by-year fixed effects, we mitigate the concern that our findings are driven by ETF fund managers favoring high-performing industries. Second, we use BlackRock's acquisition of iShares ETF from Barclays Global Investors at the end of 2009 as a quasi-experiment for our analysis. Our results continue to hold.

This paper contributes to the ongoing debate on passive versus active investing, highlighting the positive aspects of equity ETF ownership. As commented by Lettau and Madhavan (2018), ETF research is still in its infancy, necessitating further studies to comprehensively understand their impact. Corum et al. (2020), Bond and Garcia (2022), and Easley, Michayluk, O'Hara, Tālis, and Putniņš (2021) have shown that it is of great importance to study the gradual shifting of shares between passive and active investment. This paper serves as one such effort to benefit academics, practitioners, and policymakers. While this study focuses on bond pricing in the primary market, future research could explore the effects of equity

ETF ownership on bond prices in the secondary market.

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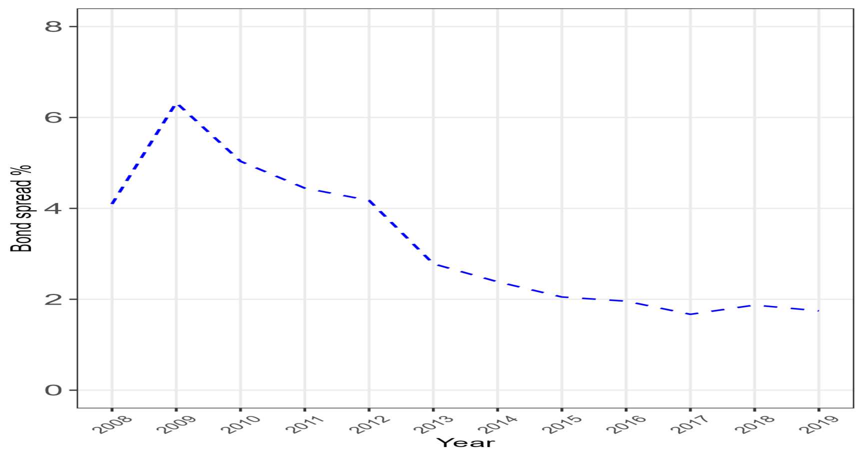

Fig. 1. **Average Bond Offering Spread by Year**

This figure plots the average bond offering spread over the sample period of 2008 through 2019. Following Gao et al. (2020), we calculate the bond offering spread (in percentage) as the difference between the offering yield and the synthetic risk-free yield.

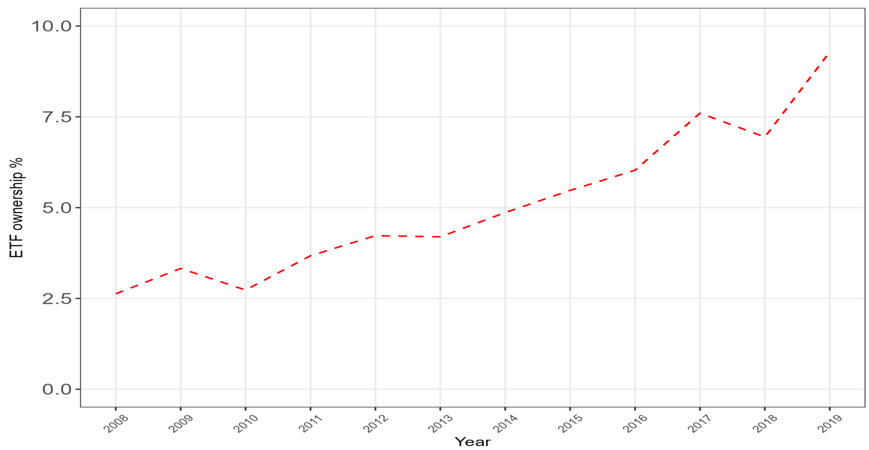

Fig. 2. **Average Equity ETF Ownership by Year**

This figure displays the average equity ETF ownership over the sample period of 2008 through 2019. The equity ETF ownership (in percentage) is calculated as shares held by U.S. domestic equity ETFs scaled by shares outstanding at the end of each quarter. The sample includes firms that have issued a fixed-rate straight bond during the sample period.

Table 1: **Summary Statistics**

This table reports the summary statistics of the variables used in our empirical analysis. *ETF* is shares owned by U.S. domestic equity ETFs scaled by the share outstanding. *Bond spread* is defined as the difference between the bond offering yield and the yield of the synthetic risk-free bond. *Size* is the natural log of market capitalization. *Age* is the number of years since the firm's IPO date. *Leverage* is defined as the total liabilities divided by total assets. *BTM* is measured as the book value of equity divided by the market value of equity. *ROA* is measured as operating income before depreciation divided by total assets. *IO* is the residual institutional ownership. *Index* is the residual index mutual fund ownership. *Volatility* is defined as the standard deviation of daily stock returns over the past year. *Return* is the average daily stock returns over the past year. *Issue size* is the natural log of total proceeds from the bond issuance. *Issue maturity* is the natural log maturity of the bond. Following Blume et al. (1998), we convert the original rating system to a numerical rating system. The numerical scale of the bond rating ranges from zero for AAA bonds to twenty for C bonds. The sample period is from 2008 to 2019. We provide detailed variable descriptions in the appendix.

Variable	Obs.	Mean	Std. Dev.	P25	P50	P75
ETF	1,612	0.048	0.029	0.032	0.045	0.059
Bond spread	1,612	0.028	0.024	0.010	0.018	0.041
Size	1,612	23.719	2.166	21.931	24.092	25.669
Age	1,612	35.772	27.022	15.000	29.000	48.500
Leverage	1,612	0.315	0.151	0.218	0.290	0.410
BTM	1,612	0.504	0.570	0.220	0.370	0.657
ROA	1,612	0.156	0.094	0.113	0.152	0.194
IO	1,612	0.152	0.175	0.035	0.166	0.271
Index	1,612	0.005	0.005	0.000	0.005	0.008
Volatility	1,612	0.021	0.014	0.012	0.016	0.023
Return	1,612	0.001	0.001	0.000	0.001	0.001
Issue size	1,612	7.047	1.347	6.031	6.908	8.001
Issue maturity	1,612	2.330	0.629	1.963	2.317	2.368
Rating	1,612	8.236	4.753	5.000	7.000	12.000

Table 2: **Baseline Regressions: Equity ETF Ownership and Bond Offering Spread**

This table reports the results of regressing the bond offering yield spread on equity ETF ownership and other control variables. The dependent variable, denoted by *Bond spread*, is calculated as the difference between the bond offering yield and the yield of the synthetic risk-free bond. The variable ETF is calculated as shares held by U.S. domestic equity ETFs scaled by shares outstanding at the end of each quarter. We control firm characteristics, stock performance, and issue-related information in the regressions. The Fama-French 48 industry and year fixed effects or industry-by-year fixed effects are controlled in various specifications. Robust t-statistics clustered at the firm level are reported in brackets. The sample period is from 2008 to 2019. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. We provide detailed variable descriptions in the appendix.

	Bond spread			
	(1)	(2)	(3)	(4)
ETF	-0.091***	-0.073***	-0.069***	-0.063***
	(-4.649)	(-3.839)	(-3.566)	(-3.017)
Size	-0.009***	-0.007***	-0.006***	-0.006***
	(-20.988)	(-16.123)	(-7.245)	(-7.089)
Age	-0.000**	-0.000**	-0.000	0.000
	(-2.180)	(-1.972)	(-0.749)	(0.800)
Leverage	0.006	0.003	-0.002	0.001
	(1.635)	(0.700)	(-0.506)	(0.193)
BTM	0.002	0.001	0.001	-0.000
	(1.446)	(0.477)	(0.450)	(-0.354)
ROA	-0.010*	-0.006	0.002	0.001
	(-1.706)	(-1.002)	(0.304)	(0.093)
IO	-0.012***	-0.010***	-0.014***	-0.013***
	(-3.675)	(-3.280)	(-4.404)	(-4.012)
Index	0.189*	0.123	0.193*	0.194
	(1.669)	(1.033)	(1.698)	(1.640)
Volatility		0.402***	0.383***	0.396***
		(4.958)	(4.585)	(4.126)
Return		-0.479	-0.758	-0.819
		(-0.870)	(-1.474)	(-1.387)
Issue size			0.001*	0.001
			(1.809)	(1.578)
Issue maturity			0.001	0.001**
			(1.597)	(2.270)
Rating			0.001***	0.001**
			(2.996)	(2.568)
Year FE	Yes	Yes	Yes	No
FF48 FE	Yes	Yes	Yes	No
Industry-by-year FE	No	No	No	Yes
Obs	1,612	1,612	1,612	1,522
Adj. R^2	0.770	0.784	0.799	0.826

Table 3: **Cross-sectional Analysis**

This table examines the heterogeneous effects of equity ETF ownership on bond offering yield spread as a function of the information environment (columns (1)-(4)) and the bond's credit rating (columns (5)-(6)). We use firm size and analyst following as proxies for information environments. We construct the firm size decile variable, *Size decile*, which equals the decile group to which a firm's market capitalization belongs before the bond issuing date. The smallest firms are assigned a value of ten, whereas the largest firms are assigned a value of one. Similarly, a decile variable based on the number of analysts following a firm, *Analyst decile*, is calculated in the quarter before the bond offering date. Specifically, firms with less analyst coverage are assigned a value of ten, whereas firms with more analyst coverage are assigned a value of one. *Junk dummy* is a dummy variable that takes a value of one for bonds below BBB rating, and zero otherwise. Lagged control variables include firm size, firm age, leverage ratio, book-to-market ratio, return on assets, residual institutional ownership, residual index mutual fund ownership, return volatility, stock returns, bond issuing size, issuing maturity, and bond rating. The Fama-French 48 industry and year fixed effects or industry-by-year fixed effects are controlled in various specifications. Robust t-statistics clustered at the firm level are reported in brackets. The sample period is from 2008 to 2019. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. We provide detailed variable descriptions in the appendix.

	Bond spread					
	(1)	(2)	(3)	(4)	(5)	(6)
ETF	0.067*	0.042	-0.009	-0.009	0.004	0.006
	(1.720)	(0.872)	(-0.291)	(-0.286)	(0.158)	(0.206)
Size decile	0.004***	0.004***				
	(7.233)	(5.450)				
ETF × Size decile	-0.022***	-0.017**				
	(-3.279)	(-2.221)				
Analyst decile			0.002**	0.001*		
			(2.411)	(1.952)		
ETF × Analyst decile			-0.015**	-0.014**		
			(-2.244)	(-2.023)		
Junk dummy					0.022***	0.022***
					(8.849)	(7.874)
ETF × Junk dummy					-0.100***	-0.090***
					(-3.590)	(-2.876)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No
Industry FE	Yes	No	Yes	No	Yes	No
Industry-by-year FE	No	Yes	No	Yes	No	Yes
Obs	1,612	1,522	1,612	1,522	1,612	1,522
Adj. R^2	0.810	0.835	0.803	0.829	0.820	0.845

Table 4: **Channel Analysis: Short-Sale Constraints**

This table examines the heterogeneous effects of equity ETF ownership on the bond offering yield spread as a function of short-sale constraints. Following prior studies, we employ idiosyncratic volatility (columns (1)-(2)) and the Amihud (2002) illiquidity measure (columns (3)-(4)) as proxies for short-sale constraints. The decile variable, *Idiosyncratic decile*, is based on idiosyncratic volatility, which is the standard deviation of the residuals when regressing monthly stock returns on the Fama-French three-factor (Fama and French, 1993) using the past five years data. A minimum of 24 observations is required to run the regression. Firms with the highest idiosyncratic volatility are assigned a value of ten and firms with the lowest volatility are assigned a value of one. The Amihud illiquidity decile variable, *Amihud decile*, is calculated based on the decile of the Amihud illiquidity measure to which a firm belongs before the bond issuing date (Amihud, 2002). Firms with a high Amihud illiquidity measure (less liquid) are assigned a value of ten, while firms with a low Amihud measure (more liquid) are assigned a value of one. Lagged control variables include firm size, firm age, leverage ratio, book-to-market ratio, return on assets, residual institutional ownership, residual index mutual fund ownership, return volatility, stock returns, bond issuing size, issuing maturity, and bond rating. The Fama-French 48 industry and year fixed effects or industry-by-year fixed effects are controlled in various specifications. Robust t-statistics clustered at the firm level are reported in brackets. The sample period is from 2008 to 2019. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. We provide detailed variable descriptions in the appendix.

	Bond spread			
	(1)	(2)	(3)	(4)
ETF	0.023	0.001	0.101**	0.086
	(0.553)	(0.022)	(1.976)	(1.522)
Idiosyncratic decile	0.001**	0.001		
	(2.461)	(1.493)		
ETF × Idiosyncratic decile	-0.012**	-0.009		
	(-2.291)	(-1.407)		
Amihud decile			0.001*	0.001*
			(1.941)	(1.650)
ETF × Amihud decile			-0.023***	-0.021***
			(-3.629)	(-2.835)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry FE	Yes	No	Yes	No
Industry-by-year FE	No	Yes	No	Yes
Obs	1,571	1,480	1,612	1,522
Adj. R^2	0.804	0.829	0.803	0.828

Table 5: **Equity ETF Ownership and Short Interest: Earnings Announcements**

This table reports the results of regressing abnormal short interest ($ABSI$) on equity ETF ownership and standardized unexpected earnings (SUE). We only include firms used in the baseline regression. We run the regressions for negative earnings surprises events (columns (1)-(4)) and positive earnings surprises events (columns (5)-(8)) separately. The standardized unexpected earnings (SUE) is calculated as the difference between the actual value of earnings per share (EPS) and the expected value of EPS scaled by stock prices. Regarding the expected EPS, we employ two proxies: i) stock analysts' median estimates of EPS and ii) stock analysts' mean estimates of EPS. The two SUE measures are denoted by $SUE - Median\ Analyst$ and $SUE - Mean\ Analyst$, respectively. For two SUE decile variables, firms with high SUEs are assigned a value of one while firms with low SUEs are assigned a value of ten. Lagged control variables include firm size, firm age, leverage ratio, book-to-market ratio, return on assets, residual institutional ownership, residual index mutual fund ownership, return volatility, and stock returns. The Fama-French 48 industry and year fixed effects or industry-by-year fixed effects are controlled in various specifications. Robust t-statistics clustered at the firm level are reported in brackets. The sample period is from 2008 to 2019. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. We provide detailed variable descriptions in the appendix.

	ABSI							
	Negative SUE events				Positive SUE events			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ETF	0.255***	0.249***	0.285***	0.269***	0.346***	0.374***	0.331***	0.363***
	(3.139)	(2.959)	(3.535)	(3.370)	(4.971)	(5.109)	(4.757)	(4.997)
SUE-Median Analyst decile	-0.001	-0.001			0.000	0.000		
	(-0.784)	(-1.604)			(0.390)	(0.591)		
ETF × SUE-Median Analyst decile	0.026**	0.032***			-0.005	-0.007		
	(2.231)	(2.731)			(-0.575)	(-0.818)		
SUE-Mean Analyst decile			-0.000	-0.001			0.000	0.000
			(-0.515)	(-1.310)			(0.221)	(0.412)
ETF × SUE-Mean Analyst decile			0.020*	0.028**			-0.001	-0.003
			(1.825)	(2.559)			(-0.063)	(-0.359)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
FF48 FE	Yes	No	Yes	No	Yes	No	Yes	No
Industry-by-year FE	No	Yes	No	Yes	No	Yes	No	Yes
Obs	4,085	4,013	4,498	4,431	10,649	10,616	11,079	11,043
$Adj.\ R^2$	0.241	0.270	0.240	0.273	0.259	0.281	0.260	0.284

Table 6: **Equity ETF Ownership and Short Interest: Subsample Analysis Based on Credit Rating**

This table runs the regressions in Table 5 for junk-grade and investment-grade groups, respectively. Panel A (B) reports the results of negative (positive) earnings surprises events. The standardized unexpected earnings (SUE) is calculated as the difference between the actual value of earnings per share (EPS) and the expected value of EPS scaled by stock prices. Regarding the expected EPS, we employ two proxies: i) stock analysts' median estimates of EPS and ii) the same quarter EPS of the previous year. The two SUE measures are denoted by $SUE - Median\ Analyst$ and $SUE - Mean\ Analyst$, respectively. For two SUE decile variables, firms with high SUEs are assigned a value of one while firms with low SUEs are assigned a value of ten. Lagged control variables include firm size, firm age, leverage ratio, book-to-market ratio, return on assets, residual institutional ownership, residual index mutual fund ownership, return volatility, and stock returns. The Fama-French 48 industry and year fixed effects or industry-by-year fixed effects are controlled in various specifications. Robust t-statistics clustered at the firm level are reported in brackets. The sample period is from 2008 to 2019. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. We provide detailed variable descriptions in the appendix.

Panel A: Negative SUE events

	Junk-grade group				Investment-grade group			
	(1) ABSI	(2) ABSI	(3) ABSI	(4) ABSI	(5) ABSI	(6) ABSI	(7) ABSI	(8) ABSI
ETF	0.251**	0.234**	0.264***	0.252**	0.107	0.163	0.189**	0.206*
	(2.548)	(2.289)	(2.701)	(2.544)	(1.336)	(1.537)	(1.992)	(1.848)
SUE-Median Analyst decile	-0.001	-0.002*			0.001	0.001		
	(-1.012)	(-1.682)			(1.382)	(1.524)		
ETF × SUE-Median Analyst decile	0.034**	0.043***			-0.008	-0.016		
	(2.477)	(3.112)			(-0.772)	(-1.147)		
SUE-Mean Analyst decile			-0.001	-0.001			0.001*	0.001
			(-0.758)	(-1.403)			(1.812)	(1.483)
ETF × SUE-Mean Analyst decile			0.032**	0.041***			-0.018	-0.018
			(2.392)	(3.231)			(-1.588)	(-1.341)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
FF48 FE	Yes	No	Yes	No	Yes	No	Yes	No
Industry-by-year FE	No	Yes	No	Yes	No	Yes	No	Yes
Obs	2,843	2,783	3,032	2,974	1,241	1,153	1,465	1,377
Adj. R^2	0.190	0.223	0.183	0.222	0.373	0.485	0.370	0.467

Panel B: Positive SUE events

	Junk-grade group				Investment-grade group			
	(1) ABSI	(2) ABSI	(3) ABSI	(4) ABSI	(5) ABSI	(6) ABSI	(7) ABSI	(8) ABSI
ETF	0.477***	0.498***	0.449***	0.467***	0.126	0.182	0.126	0.170
	(5.586)	(5.678)	(5.073)	(5.162)	(0.974)	(1.240)	(0.993)	(1.179)
SUE-Median Analyst decile	0.002***	0.002***			-0.000	0.000		
	(2.744)	(2.824)			(-0.231)	(0.233)		
ETF × SUE-Median Analyst decile	-0.026***	-0.027***			-0.010	-0.018		
	(-2.676)	(-2.649)			(-0.665)	(-1.136)		
SUE-Mean Analyst decile			0.002**	0.002**			-0.000	0.000
			(2.443)	(2.317)			(-0.055)	(0.284)
ETF × SUE-Mean Analyst decile			-0.019*	-0.020*			-0.011	-0.018
			(-1.898)	(-1.836)			(-0.797)	(-1.167)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
FF48 FE	Yes	No	Yes	No	Yes	No	Yes	No
Industry-by-year FE	No	Yes	No	Yes	No	Yes	No	Yes
Obs	5,651	5,604	5,874	5,824	4,998	4,968	5,205	5,174
Adj. R^2	0.168	0.204	0.167	0.202	0.384	0.439	0.386	0.440

Table 7: **Endogeneity Checks**

This table reports the results of endogeneity checks. Following Antoniou et al. (2022), we employ BlackRock's acquisition of iShares at the end of 2009 as an exogenous shock to the firm's ETF ownership. We use a four-year window and the sample in this exercise is from 2008 to 2011. We classify firms in the top 30% of the iShares ETF ownership averaged over 2008 and 2009 as the treatment group ($Treat = 1$) and the rest of the firms as the control group ($Treat = 0$). The dummy variable *Post* is one for the period on and after 2010 and zero otherwise. Lagged control variables include firm size, firm age, leverage ratio, book-to-market ratio, return on assets, residual institutional ownership, residual index mutual fund ownership, return volatility, stock returns, bond issuing size, issuing maturity, and bond rating. Robust t-statistics clustered at the firm level are reported in brackets. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. We provide detailed variable descriptions in the appendix.

	ETF	Bond spread	ETF	Bond spread
	First Stage	Second Stage	First Stage	Second Stage
	(1)	(2)	(3)	(4)
Treat × Post	0.012***		0.014***	
	(3.055)		(2.916)	
ETF (fitted)		-0.599**		-0.501**
		(-2.275)		(-2.198)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No
FF48 FE	Yes	Yes	No	No
Industry-by-year FE	No	No	Yes	Yes
Obs	338	338	301	301
Adj. R^2	0.323	0.561	0.286	0.590

Table 8: **Robustness Tests**

This table reports the results of robustness tests. In columns (1) and (2), we include the financial and utility industries in our sample. In columns (3) and (4), we follow Antoniou et al. (2022) in using the number of ETFs holding firm i (*Number of ETFs*) as an alternative definition of ETF ownership. Lagged control variables include firm size, firm age, leverage ratio, book-to-market ratio, return on assets, residual institutional ownership, residual index mutual fund ownership, return volatility, stock returns, bond issuing size, issuing maturity, and bond rating. The Fama-French 48 industry and year fixed effects or industry-by-year fixed effects are controlled in various specifications. Robust t-statistics clustered at the firm level are reported in brackets. The sample period is from 2008 to 2019. *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively. We provide detailed variable descriptions in the appendix.

	Bond spread			
	Include financial and utility		Alternative definition	
	(1)	(2)	(3)	(4)
ETF	-0.061***	-0.062***		
	(-3.624)	(-3.700)		
Number of ETFs			-0.001*	-0.001**
			(-1.881)	(-2.221)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
FF48 FE	Yes	No	Yes	No
Industry-by-year FE	No	Yes	No	Yes
Obs	3,311	3,216	1,612	1,522
Adj. R^2	0.612	0.626	0.796	0.825

Appendix

Table A.1: **Definitions of Variables**

Variable	Definition
Bond-level Variables	
Bond spread	Bond offering yield spread, defined as the difference between the bond offering yield and the yield of the synthetic risk-free bond, following Gao et al. (2020). Source: SDC.
Issue size	The natural log of total proceeds from the bond issuance. Source: SDC.
Issue maturity	The natural log of bond maturity. Source: SDC.
Rating	Following Blume et al. (1998), we convert the original rating system to a numerical rating system. The numerical scale of the bond rating ranges from zero for AAA bonds to twenty for C bonds. Source: SDC.
Junk dummy	Dummy variable that takes value one for bonds below BBB rating, and zero otherwise. Source: SDC.
Firm-level Variables	
ETF	Shares owned by U.S. domestic equity ETFs divided by the share outstanding. We exclude unit investment trusts from our sample. Source: S12.
Size	The natural log of market capitalization. Source: CRSP.
Age	The number of years since the firm's IPO date. Source: CRSP.
Leverage	Leverage ratio, defined as the total liabilities divided by total assets. Source: Compustat.
BTM	Book-to-market ratio, measured as the book value of equity divided by the market value of equity. Source: Compustat.

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Table A.1 – continued from previous page

Variable	Definition
ROA	Return on assets, measured as operating income before depreciation divided by total assets. Source: Compustat.
IO	Residual institutional ownership, following Glosten et al. (2021), we define it as the residual of regressing total institutional ownership on ETF ownership. Source: WRDS.
Index	Residual index mutual fund ownership, defined as the residual of regressing index mutual fund ownership on ETF ownership. Index mutual funds are mutual funds that employ a passive investment style but are not classified as ETFs. Source: S12.
Volatility	Standard deviation of daily stock returns over the past year. Source: CRSP.
Return	Average daily stock returns over the past year. Source: CRSP.
Size decile	This equals the decile group to which a firm's market capitalization belongs before the bond issuing date. The smallest firms are assigned a value of ten, whereas the largest firms are assigned a value of one. Source: CRSP and French data library.
Analyst decile	This is calculated based on the decile of the number of analysts following before the issuing date. Firms with less analyst coverage are assigned a value of ten, while firms with more analyst coverage are assigned a value of one. Source: IBES.
Idiosyncratic decile	This is calculated based on the decile of idiosyncratic volatility to which a firm belongs before the issuing date. Firms with high idiosyncratic volatility are assigned a value of ten, while firms with low idiosyncratic volatility are assigned a value of one. The idiosyncratic volatility is the standard deviation of the residuals when regressing monthly stock returns on the Fama-French three-factor (Fama and French, 1993) using the past five years data. A minimum of 24 observations is required to run the regression. Source: CRSP.

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Variable	Definition
Amihud decile	This is calculated based on the decile of the Amihud (2002) illiquidity measure to which a firm belongs before the bond issuing date. Less liquid firms are assigned a value of ten, while more liquid firms are assigned a value of one. Source: CRSP.
Raw short interest	The number of shares shorted divided by the number of shares outstanding. Source: Compustat.
ABSI	Abnormal short interest, defined as the raw short interest minus the expected short interest, following Karpoff and Lou (2010). The expected short interest is the fitted value of regressing raw short interest on size, book-to-market ratio, momentum, and industry groups as specified in Equation (3). Source: Compustat.
SUE-Median Analyst decile	Standardized unexpected earnings is defined as the earnings difference scaled by the most recent stock price. The earnings difference is the actual EPS minus the median of stock analyst's estimates of EPS. Based on the SUE calculated, we construct a decile variable where firms with high SUEs are assigned a value of one and firms with low SUEs are assigned a value of ten. We generate the SUE-Analyst decile for negative earnings events and positive earnings events separately in each quarter. Source: IBES and Compustat.
SUE-Mean Analyst decile	Standardized unexpected earnings is defined as the earnings difference scaled by the most recent stock price. The earnings difference is the actual EPS minus the mean of stock analyst's estimates of EPS. Based on the SUE calculated, we construct a decile variable where firms with high SUEs are assigned a value of one and firms with low SUEs are assigned a value of ten. We generate the SUE-Analyst decile for negative earnings events and positive earnings events separately in each quarter. Source: IBES and Compustat.

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Table A.1 – continued from previous page

Variable	Definition
Treat	We employ BlackRock's acquisition of iShares ETFs of Barclays Global Investors at the end of 2009 as the endogenous shock to ETF ownership. Following Antoniou et al. (2022), we classify firms in the top 30% of the iShares ETF ownership averaged over 2008 and 2009 as the treatment group ($Treat = 1$) and the rest of the firms as the control group ($Treat = 0$). Source: S12 and CRSP.
Post	Dummy variable that takes a value of one in 2010 and 2011, and zero in 2008 and 2009. Source: S12 and CRSP.
Number of ETFs	The natural log of one plus the number of ETFs holding a firm. Source: S12.