Passive investors in primary markets

Caitlin D. Dannhauser
Villanova University

Michele Dathan
Federal Reserve Board of Governors

April 29, 2024

Abstract

Passive investors participate in the corporate bond primary market, despite the bonds not yet being included in their benchmark index. Passive funds have higher holdings in bonds with lower underpricing, which is driven by allocations rather than secondary market purchases or ETF creation baskets. Higher passive holdings are related to deals with less demand (downsized, lower spread compression, and cold offerings) and bonds of lower quality (more likely to be downgraded). The underperformance continues over one month and one year. The main findings are driven by overallocations by underwriters to passive families and by fund families to their passive funds. Our results suggest passive funds serve as a backstop for deals, benefiting underwriters, issuers, and active funds.

Dannhauser is at the Villanova School of Business, Villanova University, 800 Lancaster Avenue, Villanova, PA 19085, and can be reached at caitlin.dannhauser@villanova.edu. Dathan is with the Board of Governors of the Federal Reserve System and can be reached at michele.h.dathan@frb.gov. We are grateful for comments from David C. Brown, Jens Dick-Nielsen, Markus Ibert, Andrew McCallum, Rabih Moussawi, Meredith Rhodes, Alex Zhou, conference participants at the Philly Five, FMA Annual Meeting and AFA Annual Meeting, and seminar participants at Arizona State University, the Federal Reserve Board, the University of Arizona, the Federal Reserve Bank of New York and Tilburg University. The analysis and conclusions are those of the authors and do not reflect the views of the Board of Governors of the Federal Reserve Board.

Corporate bond markets have fundamentally changed over the last twenty years. Driven by historically low interest rates, non-convertible bond issuance quadrupled between 2000 and 2020 according to the Securities Industry and Financial Markets Association (SIFMA) (2021), providing a critical source of capital for firms. In both frequency and quantity the financing from new issue corporate bonds vastly exceeds the equity markets. Over the same period, the percentage of fixed income mutual fund assets following a passive mandate, which seeks to replicate the performance of a benchmark index, grew from two percent to thirty percent according to the Investment Company Institute Factbook (2021). The passive trend within the asset management industry coincides with all mutual funds becoming more significant owners of corporate bonds (Koijen and Yojo, 2023). This paper studies the intersection of these two key market developments -- the role of passive investors in the corporate bond issuance market.

To meet their passive mandate, index mutual funds and ETFs closely match their holdings with the underlying index constituents. Since new issue bonds are not constituents until the next index rebalancing date -- typically month-end -- there *should* be no passive fund primary market demand. However, the predictability of index inclusion, the illiquidity of secondary corporate bond trading, and the on average positive underpricing may incentivize funds to submit orders to purchase bonds in the primary market. Receiving an allocation of new issue bonds results in deviations from the current index but ensures that the fund holds bonds that are ultimately included in the benchmark, and possibly generates excess returns that can be used to offset expenses.

Using daily ETF holdings between January 2015 and December 2020, we are the first to show that ETFs hold new issue bonds on the offering date, before the bonds are added to the index.[1] For the 7,089 U.S. corporate bonds issues over our sample period, we use the index inclusion rules of ETFs to determine which bonds are eligible for the benchmark followed by each ETF. Of the 52,000 potential bond-ETF pairs, we find a near equal split between matches made on the offering date, in subsequent trading days, and never made. We then examine the performance

[1] In contrast, passive funds rarely participate in IPOs (ETFTrends, 2021) because index changes are made by committee (e.g. S&P 500 indices) or annually (e.g. Russell indices). Evans et al. (2023) document that firms with higher ETF ownership have a higher propensity to conduct seasoned equity offerings. However, they do not provide evidence that ETFs actually buy shares in the primary market.

of new offerings controlling for latent demand by restricting the sample to bonds that meet each ETF's benchmark standard. Our second novel finding is that ETFs have higher holdings in bonds with lower first day returns (i.e., lower underpricing). A one standard deviation increase in ETF offering date holdings is associated with underpricing that is 3.5 basis points (bps) lower. The effect is economically significant, representing 10% of the average underpricing in the sample.

There are three potential sources for ETF offering date holdings: primary market allocations, secondary market purchases, or inclusion in an ETF creation basket. Exploiting the illiquidity of the corporate bond market and measuring ETF primary market dollar values we are able to disentangle the source. For a subset of new offerings, the total offering date holdings of all ETFs exceeds the days' total secondary market trading and ETF creation volume in the bond. For these bonds, we know for certain at least one ETF received a primary market allocation. In contrast, there are a subset of new issues that are index-eligible but with zero total ETF offering date holdings. These offerings that are likely placed with other institutional investors, such as active mutual funds and insurance companies, serve as our control group. We find that bonds in the control group have average underpricing that is more than 5 times higher than bonds with definite ETF allocation (0.83% compared to 0.16%). The findings imply that passive funds are not favored in the allocation of attractive first day returns, despite the fact that passive funds come from large families (Sherman and Titman, 2002), are repeat primary market participants (Cornelli and Goldreich, 2001), and are unlikely to 'flip' their holdings (Jenkinson and Jones, 2004). Instead it is perhaps due to passive funds' mandate-driven investment that does not require information production, as well as a structure that precludes significant quid pro quo trading arrangements. Supporting the conjecture of Rock (1986) that underpricing is necessary to attract uninformed investors, on average underpricing is still positive.

The characteristic-driven investment of passive funds that is insensitive to price serves as a backstop for offerings with weak demand from other investors, similar to the "dumping ground" hypothesis of Ritter and Zhang (2007). Being able to complete the deal avoids the reputational risk for underwriters and the financing risk for corporations of a cancelled issuance and helps explain why firms issue index-eligible bonds (Dathan and Davydenko, 2020). To test this conjecture we use bookbuilding data from Refinitiv's IFR to examine the difference between proposed and realized deal terms. We find a higher ETF offering date holdings in deals that are downsized, deals that have lower spread compression between initial price talk and final pricing, and deals that have lower subscription rates.[2] Therefore it appears that the deals with higher ETF holdings have lower primary market demand. Beyond the bookbuilding process, we examine post-pricing events known to be associated with weak demand and quality. ETFs have significantly higher holdings in deals with negative underpricing (cold offerings), which Krigman et al. (1999) claim is evidence of weak demand at the offer price. There is also a higher likelihood the bonds are downgraded within the first year, suggesting the deals had potentially greater credit risk than reflected in their offering date rating. We also find that bonds allocated to ETFs continue to underperform in the first month and year. Thus, the results suggest that underwriters and corporations are able to use the repeat price-insensitive, characteristic-driven demand of passive funds to complete deals that otherwise would not occur at the stated terms.

The ETF-focused analysis grants us precision to identify when funds obtain new bonds, but it is limited to a subset of ETFs who report daily holdings. Thus, index mutual funds and monthly reporting ETFs that likely face similar primary market incentives are excluded from our results so far.[3] Further, we are unable to make comparisons between active and passive funds. To take a broader perspective, we turn to monthly mutual fund holdings data, focusing on the subset of corporate bond offerings that occur on the last two trading days of the month.[4] With this sample we confirm the negative relation between passive fund holdings and underpricing and short- and long-term returns. In contrast, active fund holdings are positively related to underpricing and short- and long-term performance.

In practice, the allocation to individual funds is the joint decision of underwriters and fund families. Underwriters grant allocations at the fund family level, based on the collective

[2] The subscription data is only available for a small subset of offerings, especially those that are oversubscribed.

[3] Notably, Vanguard ETFs hold significant passive assets but only report holdings monthly due to the unique VETF structure in which the ETF is a share class of the index mutual fund.

[4] The economic effect of the results using just month-end offerings is similar, but the power of the study is limited by the sample size. Further, we are able to identify offerings that occur on the second to last day of the month, but trading begins on the next day. It is likely that these offerings occur after market hours.

indications of interest. The allocation to the family is then distributed by family managers to individual funds. To determine the source of the allocation we develop two measures of abnormal deviations. Abnormal allocation to the family from the underwriter is the difference in the total family ownership and the family's asset-weighted implied ownership of the total industry allocation. To proxy for the family's abnormal allocation to its passive funds, we compute the difference between the ownership of passive funds and the level implied by the asset-weight of passive funds in the family. Both abnormal allocations to and by the family are negatively related to the performance of new issuances. Thus, underwriters overallocate passive families and the family overallocates their passive funds in new issue bonds with lower underpricing and subsequent short- and long-term performance. The results suggest that not only do underwriters and corporations benefit from the repeat price-insensitive demand of passive investors by allowing deals to be completed, but so do the active funds in the family. To provide further evidence of the benefit we study the performance of active funds. We find that in months with no underpricing there is no significant difference in the gross returns of funds from families with passive peers relative to their category peers. However, active funds with passive peers have greater performance relative to their category peers in months with greater underpricing.

In our final analysis, we investigate whether passive funds are acting optimally by buying corporate bonds in the primary market. In particular, since passive funds are deviating from their benchmark when buying new issue bonds before their addition to the index, we ask whether passive funds would be better off not asking for new issue allocations and buying bonds in the secondary market. Using our sample of daily ETF holdings, we first show that the price paid by ETFs for bonds in the primary market is slightly lower than the estimated price they pay for bonds in the secondary market; this is not surprising, since we show that the bonds allocated to ETFs still have positive underpricing (even if they have lower underpricing than non-allocated bonds). However, low prices are not necessarily important to passive fund managers, who are trying to provide exposure to an asset class rather than deliver alpha. A more important reason to participate in the primary market is *access* to corporate bonds, which trade very infrequently, especially after the first 10 days (Goldstein et al., 2021). We show that in one third of our sample, offer date holdings by ETFs exceed market-wide trading volume on the rebalancing date at which the bond is added to the index, indicating that primary purchases are required to achieve desired holding levels. We conclude that even if passive funds receive less attractive allocations than other investor types, their participation in the primary market is still optimal.

By explicitly analyzing how passive investors participate and perform in the primary market relative to other investor types we contribute to the growing literature on the dynamics of the corporate bond new issue market. While previous papers have looked at the allocations to insurance companies based on relationships with underwriters (Nikolova et al., 2020 and Nagler and Ottonello, 2022), we are the first to look at allocations to passive investors.[5]

This paper is also related to the literature examining the overall impact of ETFs and other passive investors in the corporate bond market. Dannhauser (2017) documents that higher ETF ownership reduces bond yields by looking at changes to Markit iBoxx index inclusion rules. Dannhauser and Hoseinzade (2022) show that ETFs also induce secondary market trading fragility in corporate bonds by catering to liquidity-seeking investors. Several papers also examine the impact of passive investors on liquidity of the underlying corporate bonds, such as Dick-Nielsen and Rossi (2019), Holden and Nam (2022), and Marta (2022). Koont et al. (2023) and Shim and Todorov (2023) study the flexibility of representative sampling, rather than strict replication, techniques of the primary ETF market. While these papers focus on the effect of passive investors in secondary trading market for corporate bonds, this is the first paper to examine the potential effect that passive investors have in primary corporate bond markets.

Finally, our results help explain why unlike in equity markets active bond funds do not underperform their passive counterparts. Choi et al. (2023) argue that passive funds sacrifice performance by holding more liquid bonds. We show that they do make optimal decisions in varying from the benchmark by participating in the primary market. Using an indirect allocation proxy, Cici et al. (2023) find that primary market allocations driven by fund-underwriter relationships contribute to active fund outperformance. Our findings suggest that having passive

[5] Other papers that look at the corporate bond primary market include examinations of the partial adjustment in bond (Wang, 2021), syndicate dynamics (Bessembinder et al., 2021), and secondary market trading shortly after issuance (Goldstein et al., 2021 and Nikolova and Wang, 2022)

funds in the same family intensifies the relation. This finding also expands the literature on family favoritism among active funds in equity IPOs by Gaspar et al. (2006) to reflect the modern mutual fund family in the more frequent and sizable corporate bond new issue market. Because we argue that passive funds are acting optimally by participating in the primary market, our results point to the fact that investors should consider diversifying their exposure to fixed income markets away from solely passive funds.

1. Data

The data for our analysis comes from five main sources: Mergent's Fixed Income Security Database (FISD), the enhanced version of FINRA's Trade Reporting and Compliance Engine (TRACE), Morningstar Direct, the Center for Research in Security Prices (CRSP) Mutual Fund Database, and bookbuilding data from Refinitiv's IFR.

We focus our analysis on fixed rate U.S. corporate bonds, with a FISD bond type of "CDEB", that make semiannual coupon payments. We exclude convertible bonds, perpetual bonds, preferred securities, asset-backed and mortgage bonds, medium term notes, and foreign currency bonds. Exchange offerings are also removed as these are exchanged from an existing security and are not new issue bonds. Our preliminary sample includes 7,089 U.S. corporate bonds that are eligible for index inclusion, of which 2,551 are issued pursuant to Rule 144A. Due to infrequent trading, for the return tests we exclude Rule 144A bonds.[6]

TRACE provides daily trading data, with any observations on weekend or full-day market holidays reported by SIFMA deleted.[7] The data is filtered for cancellations, corrections, reversals, agency transactions, duplicate inter-dealer trade reports, and non-cash trades using the methodology of Dick-Nielsen (2014). We follow the literature in eliminating transactions with prices under $5 and over $1,000 (Bali et al., 2021), trades whose price is more than 20 percent from the median price of the ten surrounding trades (Nikolova, 2020), and trades of less than $100,000 in par value (Bao, 2018 and Bessembinder et al., 2009).

[6] The tests are robust to the inclusion of Rule 144A bonds, but the long-term results lose power due to frequent zeros.
[7] The historical bond market calendar can be found here: https://www.sifma.org/resources/general/holiday-schedule/

1.1. Main Variable Definitions

Our holdings data comes from two main sources: Morningstar Direct for ETFs daily and CRSP for mutual funds monthly. The Morningstar data is downloaded for 20 bond ETFs that hold U.S. corporate bonds between January 2015 to December 2020 and holdings reported on weekends or holidays are deleted. As of the end of the sample period, the approximate corporate bonds assets under management (AUM) for the ETFs in our sample represents 61% of the AUM of ETFs that hold corporate bonds and 93% of assets held by ETFs that report daily holdings. A summary of these ETFs' characteristics can be found in Appendix A. We then compute the percentage of a new issue bond i that is held by ETF j on the bond's offer date t as

$$Offer\ Date\ Holding_{i,j,t} = \frac{Bonds\ Held_{i,j,t}}{Offering\ Amount_i} \tag{1}$$

For many bond-ETF pairs, this variable may be 0 because it is outside of the ETF's investment mandate; for example, we would expect that an investment grade ETF should have 0% offer date holdings for all new issue high yield bonds. In order to account for this latent demand, we include in our sample only bonds that we estimate are included in the index that the ETF tracks. To do so we use fund prospectuses to determine the index used as the benchmark for each ETF. Using rules from index providers, we code each benchmark's inclusion criteria, which are most frequently related to minimum offering size, rating, and time to maturity.[8] Thus, we are able to estimate which bonds each ETF would want to purchase.[9]

For the second part of the analysis, we use CRSP to obtain monthly holdings of all passive and active bond funds. We restrict our sample to corporate bond funds using CRSP and Lipper Objective Codes.[10] Passive funds are identified using fund name from CRSP following Appel et al. (2016), Busse and Tong (2012), and Iliev and Lowry (2015) where the CRSP database index

[8] For indexes with an upper bound in terms of time to maturity (e.g., bonds with no more than 10 years to maturity), we calculate the time to maturity as of the first day of the month following issuance, which is commonly the date when indexes rebalance.

[9] In untabulated robustness tests, we confirm that our results hold using several other measures of offer date holdings: offer date holding \% including only bonds that are held within the first 60 days of a bond's life, offer date portfolio weight in an ETF minus the estimated index weight, and the offer date portfolio weight in an ETF minus the estimated index weight including only bonds held within the first 60 days of a bond's life. These analyses are available upon request.

[10] We restrict the sample to funds with CRSP objective codes beginning with IC or Lipper Objective Codes equal to A, BBB, SII, SID, IID, or HY.

fund flag equal to D or B.[11] ETFs are identified using the CRSP indicator flag and a name search. A fund is identified as an index mutual fund if at any point in fund history it is flagged by the name search or a CRSP identifier and is not flagged as an ETF. We eliminate leveraged or inverse funds.[12] We impute the bonds held by the ETF share class of Vanguard by taking the percentage of assets in the ETF times the bonds held by the portfolio. For this sample, we use month-end holdings at the end of a bond's first month and compute $ETFOwnership$, the portion of a bond's offering amount help by all K ETFs as,

$$ETF\ Ownership_i = \frac{\Sigma_{j=1}^{K}\ Bonds\ Held_{i,j}}{Amount\ Outstanding_i}. \tag{2}$$

We compute similar measures for active mutual funds, $AMF\ Ownership$, and index mutual funds, $IMF\ Ownership$. $Passive\ Ownership$ is defined as the sum of ETF and index mutual fund ownership.

Our outcome variables focus on the immediate, short-term and long-term returns of the new issuances, as well as, proxies for the demand and quality of the deals. Using TRACE data, we compute the market-adjusted returns for each new issue bond i in the n trading days since the offering date t following Bessembinder et al. (2021) and Cai et al. (2007) as

$$ORet_{i,t+n} = OR_{i,t+n} - Index\ Return_{c,t-1\rightarrow t+n}. \tag{3}$$

OR is the raw return of the bond computed as

$$OR_{i,t+n} = \frac{P_{i,t+n} + AI_{i,t+n} - OP_{i,t}}{OP_{i,t}}, \tag{4}$$

where $P_{i,t+n}$ is the trade size-weighted average price of secondary market trades on trading day $t+n$, $AI_{i,t+n}$ is the accrued interest and $OP_{i,t}$ is the offering price. To account for market conditions we subtract the raw returns from the returns of the rating- and maturity-matched Bank of America ICE bond index, c, relative to the day before issuance, t-1. Our main measure of the

[11] Index funds are flagged if the CRSP fund name contains the following strings: SP, DOW, Dow, DJ or if the lowercase version of the CRSP fund name contains: index, idx, indx, ind_ (_indicates space), aggregate, composite, russell, s&p, s and p, s & p, msci, Bloomberg, kbw, nasdaq, nyse, stoxx, ftse, wilshire, Morningstar, 100, 400, 500, 600, 900, 1000, 1500, 2000, 3000, or 5000.

[12] Inverse and leveraged funds are identified if the lowercase version of their name contains the following strings: plus, enhanced, inverse, 2x, 3x, ultra, 1.5x, 2.5x.

immediate return to primary market investors is $Underpricing_i$, which is defined as the first non-missing $ORet_{i,t+n}$ in the first five trading days.

For short-term returns we use $ORet_{i,t+n}$ over the first twenty trading days after the offering, (i.e., $0 \leq n \leq 20$). In our analysis of long-term returns we use the measure, Ret_{L5M} obtained from WRDS, which is computed for bond i in the month, m is computed as

$$R_{i,m} = \frac{P_{i,m} + C_{i,m} + AI_{i,m}}{P_{i,m-1} + AI_{i,m-1}} - 1. \tag{5}$$

$P_{i,m}$ is the trade-size-weighted price of the bond on its last trading day in a month, requiring the trade to have occurred in the last five trading days in the month. $C_{i,m}$ is the coupon payment in the month, if any, and $AI_{i,m}$ is accrued interest.[13] We index adjust the raw return by subtracting the return of the rating- and maturity-matched bond index, c, between the last day has an observable price in month m-1 and month m to compute monthly return:

$$MRet_{i,m} = R_{i,m} - Index\ Return_{c,m}. \tag{6}$$

To evaluate the long-term performance of new issue bonds, we compute the cumulative abnormal returns (CAR) for each month m since the issuance month $m = 0$ as

$$CAR_{i,m} = \Sigma_{m=1}^{12}\left(MRet_{i,m}\right). \tag{7}$$

In computing, CAR when a bond-return is missing, due to illiquidity, we assume the raw return is equal to the ICE index return and thus the monthly excess return is zero.

We also use bookbuilding data from Refinitiv's IFR, a dummy for cold offerings, and ratings changes within the first year of a bond's life. From the bookbuilding data we scan the DealNotes to determine changes in deal terms between the announcement of the deal and the pricing of the deal. Following Hotchkiss et al. (2024) we define $Spread\ Compression_i$ as the difference between the actual offering spread to Treasury and the initially proposed spread. Further, we use dummy variables, $Upsize_i$ and $Downsize_i$ to denote deals that have offering

[13] Dick-Nielsen et al. (2023) highlight issues in computing corporate bond returns using TRACE. The authors highlight that the WRDS standard of winsorizing returns leaves in erroneous trades and minimizes the effect of actual outliers. We have ensured our results are robust to our own calculations of returns that follows the filtering standards and eliminates outliers using deviations from surrounding trade prices. We present the results with WRDS returns for replication purposes.

amounts greater and less than the amount originally proposed, respectively. Finally, from Refinitiv's IFR we obtain the $Subscription\ Ratio_i$ when available, which is the order book size scaled by the initial offering amount.[14] Next, we consider post-issuance variables that have been used in the literature to reflect the quality of an issuance. $Cold_i$ is a dummy equal to one when underpricing is negative, and zero otherwise. As discussed in Krigman et al. (1999), cold offerings indicate that underwriters had a difficult time building a book of committed investors. We define $Upgrade_i$ ($Downgrade_i$) as an indicator variable equal to one if within 365 calendar days of the issue date, the bond's rating or outlook is increased (decreased) by one of the three main ratings agencies, and zero otherwise. Finally, we consider short-term and long-term returns defined above.

[Insert Table 1]

Table 1 shows the summary statistics for the bonds used in our analysis of ETF holdings. Panel A shows bond characteristics of all new issue bonds, Panel B shows performance statistics for all non-Rule 144A bonds, and Panel C shows the distribution of offering date holdings by ETFs.[15] The median bond in this sample has a face value of $600 million, has 8 years to maturity, and has an average rating of BBB. The median (mean) underpricing is 21 (34 bps), and 27% of offerings are cold offerings.

2. Empirical Analysis

Our empirical study proceeds in three steps. First in subsection 2.1 we examine if passive funds participate in corporate bond primary markets and the initial underpricing of any offering date holdings. We also attempt to disentangle the source of the offering date holdings. In subsection 2.2, we analyze the demand for, and quality of the new issuances held by passive ETFs. Finally, in subsection 2.3 we expand the study to the entire mutual fund industry with a focus on family dynamics.

---

[14] The subscription ratio is not frequently available and generally is populated for highly oversubscribed data reflecting bias in the data.

[15] We exclude Rule 144A bonds from the returns analysis due to their infrequency of trading. The main results continue to hold including them, but in the long-term returns sample we lose power due to many zeros from the assumption of returns equal to the index.

2.1. Passive ETFs investment in new issue bonds

It is easy to determine if at issuance a bond will be included in a benchmark because indexes are designed with clear inclusion criteria and most include an unlimited number of securities. Despite the predictability, there is a delay between the issuance and the index inclusion as a bond only becomes an index constituent at the next rebalancing. Thus, passive bond funds face a predicament. To explicitly follow their passive mandate, they should wait until the next rebalancing date rather than participating in primary corporate bond markets. However, in waiting the funds may face increasingly illiquid secondary markets as Goldstein et al. (2021) show that for the median corporate bond trades only five times on the tenth trading day compared to 29 times on the second. Further, the positive returns for underpricing that are not in the benchmark can be used to offset negative tracking error or to minimize fees in a manner similar to stock lending revenue. Overall, it is unclear when a passive investor would want to acquire a newly issued bond that will soon be eligible for its index. For this reason, we first examine when (and if) new issue bonds are acquired by our sample of bond ETFs.

Panel C of Table 1 reveals that yes, passive ETFs opportunistically deviate from their benchmark by holding bonds on the offering date. The median (mean) offering date aggregate holdings for the daily ETF sample is 0.28% (0.54%). In Figure 1 we plot the time series average of the average monthly offering date holdings of all the ETFs in our sample and the monthly average VIX. In times of higher volatility, the percentage held by ETFs on offer date drops precipitously; particularly in November 2018 and March. Siani (2022) shows that during such times, new issue premiums to existing bonds increases. Given that ETFs hold fewer new issuances, we view this as the first evidence that ETFs may underperform other investor types in the primary market.

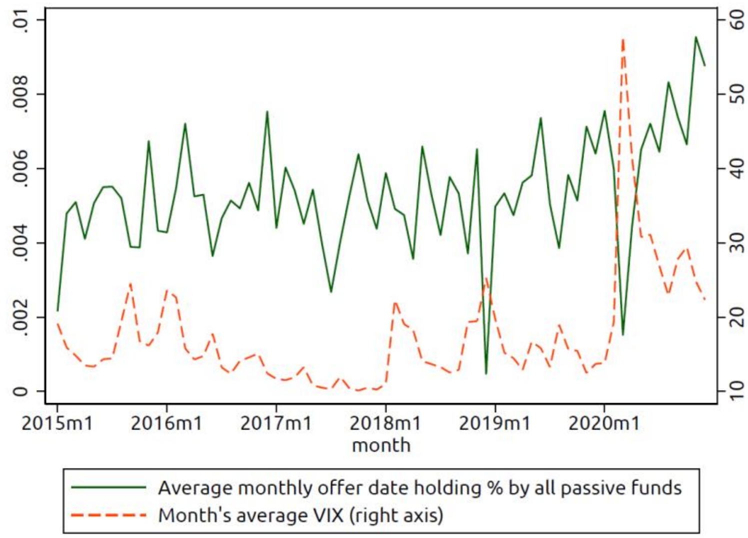
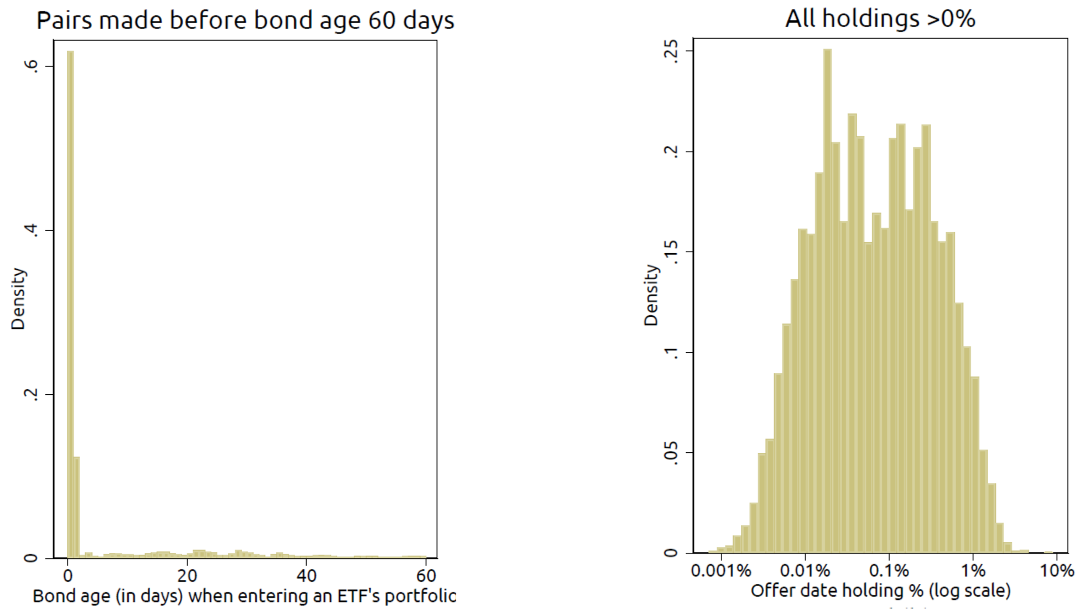


Figure 1. This figure presents the time series of average monthly offer date holding by issuance month. The solid line shows the average monthly ownership by the individual ETFs in our sample. The dotted line presents the average volatility implied index (VIX) for the month.

To explore the distribution of holdings, we use our benchmark rules and the characteristics of the 7,038 new issuances over the daily ETF sample to identify 52,085 potential bond-ETF pairs. Of the potential pairs, 36.20% are established on the offering date and 34.82% are made within the first year of trading, with 7.22% established on the day after the offering. In Panel A of Figure 2 we plot the density of any bond-ETF pairs that are established in the first 60 trading days confirming the density on the first two trading days. The summary statistics reveal that not each ETF participates in the bonds eligible for its benchmark with the median (mean) offering date holding of bonds eligible for the ETF's benchmark is 0.00% (0.07%) of the bond's offering amount. However, Panel B of Figure 2 reveals significant heterogeneity in the offering day ownership for the bond-ETF pairs established on the offering date. The mean (median) non-zero offer date holding is 0.20% (0.07%), which equates to $1.6 million ($500,000) in holdings of the average offering.



Panel A: Bond age when entering an ETF *Panel B: Offering date daily holdings for ETFs*

Figure 2. This figure presents the distribution of bond age at which bond-ETF pairs are first made in Panel A. Panel B presents the distribution of ownership by an individual ETF on the offering date for all non-zero observations.

We continue by exploring the relation between underpricing and ETF ownership. Underpricing is used in the literature as a proxy for the returns to primary market investors. Since most primary market deals have positive underpricing, the allocations are perceived to be a reward from underwriters. To examine the underpricing we use the following regression for bond i held by ETF j with rating r from a firm in industry v on offering date t in year y as:

$$Underpricing_{i,j,r,v,t,y} = \gamma_r + \lambda_y + \rho_v + \nu_j + \beta_1 Own_{i,j,t,y} + \beta_2 X_{i,j,v,r,y} + \epsilon_{i,j,v,r,y}. \quad (8)$$

To address selection concerns we restrict the sample to only the bond-ETF pairs that meet the eligibility standards of the applicable index. Following the literature in all specifications we use rating fixed effects, γ_r, to control for time-invariant difference in bonds of different credit quality. Ratings are computed as the median of the original conversion of the letter ratings from the three main ratings providers (e.g. AAA=1, AA+=2,…). All ratings CCC+ and below are considered one ratings group due to a limited number of issuances at each rating. Year fixed effects, λ_y, control for general trends in the issuance and ETF holdings, and industry fixed effects, ρ_v, address time-invariant differences across industry groups. We also include ETF fixed effects,ν_j, effects to address unobserved heterogeneity across funds, including time-invariant skill and power.

Table 2 presents the results. All columns include ratings fixed effects. Column (1) includes no controls, column (2) adds controls, and column (3) includes controls and the full set of fixed effects. Standard errors double clustered at the issuer and month level are reported below the coefficients. In all specifications, the relationship between offer date holdings and offer date return is significantly negative: ETFs hold more corporate bonds on offer date in offerings with lower underpricing. A one standard deviation increase in the offering date holdings by the ETFs in our sample results in a 3.5 bps lower underpricing, which is 10% of the unconditional average underpricing of 34 bps.[16] In terms of dollar values, multiplying 3.5 bps by the mean bond size of $791 million, the dollar value of lower underpricing in one bond deal is approximately $275,000, and over $1.2 billion across the 4,407 deals with underpricing data.

[Insert Table 2]

There are three potential sources of the offering date holdings of ETFs. First, the bonds could be obtained by an allocation due to their direct participation in the primary market. Second, the ETF manager could elect to purchase the bond in the secondary market directly. Third, the bond could be delivered to the ETF by authorized participants (APs) as part of a creation basket. In this last alternative, recipients of primary market allocations flip their allocations, notably insurance companies as found by Nikolova and Wang (2022) to market makers, who are often APs. APs can then potentially include the bond in the basket of the underlying that is exchanged with the sponsor for ETF shares as part of the primary ETF market.

To attribute the source of the underpricing to different market participants we sort the 4,407 corporate bonds with non-missing underpricing data into four sub-groups. First, we identify 394 bonds that were definitely not allocated to ETFs: for these bonds, there are no holdings on offer date across all ETFs.[17] Second, we identify 834 new issues that were acquired via allocation or from APs. We rule out that these bonds were acquired via secondary market

[16] This is calculated as the standard deviation in offer date holdings, 0.00229, multiplied by the coefficient in column (3), -0.151. We get similar results if instead of one standard deviation, we use the change from zero offer date holdings to the mean non-zero holdings of 0.20%.

[17] Note that there may be additional bonds where ETFs received no allocation, but they will not be included in this sample if at least one ETF acquired the bonds on offer date either by purchase or in-kind creation.

purchases, because total ETF holdings exceed the institutional ask volume in TRACE on the offering date. Third, there are 1,078 bonds that we partially attribute to either allocations or secondary market buying by the fund. For these bonds the aggregate ETF holdings are in excess of the total creation dollars, computed as the change in shares outstanding times the daily net asset value for all ETFs with offering date holdings.[18] The fourth group consists of 182 bonds that were at least partially allocated to ETFs. These bonds, which are a subset of the prior two groups, have total ETF holdings greater than the combined secondary OTC market purchase and primary ETF market creation volumes. Table 3 presents the average underpricing and short-term performance of the different groups. Column (6) present tests of the difference in mean performance variables of the subset of bonds that ETFs did not receive allocations (column 2) and the subset for whom we know that ETF holdings are at least partially attributable to primary market allocations (column 5).

[Insert Table 3]

The results show that new issue bonds which are allocated to ETFs perform significantly worse. The highest underpricing and short-term returns are to those bonds without any ETF holdings on the offering date. The lowest performance is for the offerings that are acquired via primary market allocation or creation baskets, suggesting that dealers who serve as both primary bond market bookrunners and as primary market ETF APs contribute to the performance trends documented in this paper. Likewise, bond holdings that we attribute at least partially to primary market allocations have statistically significantly lower underpricing and short-term returns compared to the subsample completely allocated to non-ETF participants. Underpricing is 0.16% on average for bonds allocated to ETFs compared to 0.83% on average for bonds not allocated to ETFs. This underperformance remains significant through the first month of trading, with non-allocated bonds outperforming allocated bonds by more than 2% by trading day 10.

[18] The second and third groups are not mutually exclusive.

2.2. Issuance demand and quality

A recent literature (Wang, 2021; Hotchkiss et al., 2024) uses details on the bookbuilding process of corporate bonds to determine the quality of new corporate bond issuances. In this subsection, we examine different characteristics of bonds to identify the demand for and quality of the new issue bonds that ETFs hold on the offering date.

We begin by using Refinitiv's IFR data to examine the difference between the deal terms upon announcement and the final pricing, which typically takes place within one business day (Wang, 2021). Specifically, we consider if the deals size changes - downsized deals indicate less demand from investors and upsized deals indicate more demand than the original proposed offering amount. Demand is also related to changes in pricing terms, which are generally provided as a spread over Treasury rates. We look at spread compression, calculated as the difference between the final offering spread and the first spread indicated in the price talk, as another indication of investor demand. Finally, for a subset of deals there is data on subscription levels (e.g., a subscription ratio of 2x indicates that the book of demand was twice the offering amount). Table 4 presents the results using specifications similar to Equation (8). Since return data is not required, we include Rule 144A bonds with a dummy variable as a control. We conduct linear probability models for downsizing and upsizing in columns (1) and (2) respectively. The specifications do not include log amount as a control due to reverse causality. Column (3) – (4) runs fixed effects regressions with spread compression and subscription rate as the main dependent variables, respectively, and standard errors clustered at the issuer level.

[Insert Table 4]

The results indicate that offering date ownership by ETFs is associated with lower primary market demand – greater probability of downsizing, lower spread compression, and lower subscription rates. There is no statistically significant relation for the probability of upsizing.

We also rely on the equity literature for post-market evidence of weak demand and deal quality. First, we use a dummy for cold offerings, which takes on a value of 1 for deals with negative first day returns (overpricing), as a proxy for weak demand from committed investors.

Second, we use changes in ratings by any of the three major rating providers over the first calendar year of a bond's life to proxy for potential mispricing of credit risk at the offering. Downgrades (upgrades) proxy for a deterioration (appreciation) in credit quality with investors receiving offering spreads lower (higher) than warranted by long-term fundamentals. Third, we also consider short-term returns over the first twenty trading days and long-term performance over the first year as ex-post measures of primary market deal quality. The performance beyond the first trading day reflects the markets attempts to find the of fair value of the offering. Table 5 presents the results. Panel A includes linear probability models for cold offerings in Column (1), downgrades within the first year in Column (2) and upgrades within the first year in Column (3). Columns (2) and (3) do not require returns so the sample size is increased by the inclusion of Rule 144A bonds. Panel B presents the short-term performance results over the first twenty trading days (approximately one month). Specifically, we present the results for days 0, 1, 2, 5,10, and 20.[19] Panel C shows the results for long-term performance for 1, 2, 3, 6, 9, and 12 months after issuance.

[Insert Table 5]

The results indicate that ETFs hold a higher offer date percentage in corporate bonds offerings with less premarket demand and of lower quality. ETFs have higher holdings in cold offering where the first day's trading price ends up lower than the offering price, implying the bond's yield was too low. Greater offering date holdings by an ETF also positively predicts the likelihood of future downgrade and negatively predicts the likelihood of future upgrade. In terms of economic magnitude, a one-standard deviation increase in offer date holdings by an ETF increases the chances of a downgrade in the first year by 0.4 percentage points, which is 3 percent of the unconditional average. Thus, ETFs are more likely to have higher holdings in bonds with lower yield spreads than justified by long-term credit risk and lower holdings in bonds with yield spreads more advantageous to investors. Further, the short-term performance suggests that the new issue bonds continue to underperform through the first twenty-trading days. Panel C documents that the coefficient for offering day ownership is consistently negative through all

[19] In Appendix B we plot the coefficients and 95% confidence intervals for each post-issuance trading day.

twelve months post issuance and the magnitude is growing. However, the effect is not statistically significant. The effect is also not significantly positive, implying that the underpricing previously documented does not revert. Overall, these findings are consistent with passive investors being used as a `buyer of last resort' in new issue bonds in order to ensure a deal is completed. In the absence of passive demand, either the offering may have been withdrawn (worse for the firm and the underwriters) or the terms of the bond would need to be made more attractive to active investors (worse for the firm). Thus, firms and underwriters are benefiting at the expense of passive investors.

2.3. The broad mutual fund industry and within family dynamics

The ETF sample used so far allows us to precisely identify the exact date that the funds acquire new bonds. However, the passive investment trend extends beyond just ETFs that report daily holdings. Notably excluded from the prior analysis are Vanguard ETFs and all index funds that report holdings monthly. In this section, we extend our analysis using monthly holdings information from CRSP. We also use this broader sample to compare how passive funds perform relative to active mutual funds and to consider within family allocation decisions.

For new issue bonds issued within a month, month-end holdings will represent allocations and purchases on the offering date, plus any trading decisions within the offering month. To minimize the potential for non-allocation decisions driving our results, we restrict the analysis of this subsection to bonds issued on the last two trading days of a given month following Reuter (2006). The results are robust to the restriction to the last trading day but lack power. Further, we note several issuances that price on date t but do not commence trading until date t+1 suggesting that the pricing was completed after the market close. Due to the sample size we extend the sample period to January 2011 to December 2020. Table 6 presents bond characteristics of the sample of month end bond offerings in Panel A. Panel B presents summary statistics on the performance variables underpricing, short-term returns, and long-term returns.

[Insert Table 6]

Figure 3 plots the average holdings of new issue bonds for active mutual funds, index mutual funds, and ETFs over the expanded sample period. The collective passive ownership which is the sum of index mutual fund and ETF ownership is also plotted. The bars represent the number of offerings that meet the offering date occurring in the last two trading days each year. The figure shows that passive holdings have increased steadily over the sample period, with very similar growth patterns for both index mutual funds and ETFs.[20] The average holdings of active funds are greater than passive funds and show less of a pronounced increase, though they have been on an upward trend since 2015. The combined holdings of all fund investors follow a similar trend to that documented in Koijen and Yogo (2023) who examine the overall ownership structure of U.S. corporate bonds.

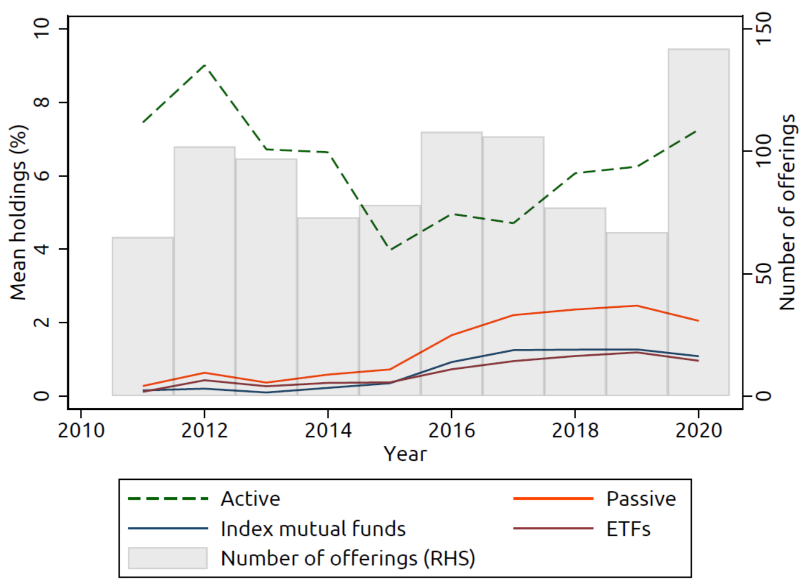


Figure 3. This figure presents the time-series of the for the sample period of the month-end offerings. The left axis plots the average ownership of active mutual funds, index mutual funds. and exchange traded funds (ETFs). Passive ownership is the sum of index mutual fund and ETF ownership. The right axis plots the number of issuances each year that occur in the last two trading dates of a month.

[20] ETF holdings are higher here compared to the summary statistics, as this sample will include the entire universe of ETFs, not just the daily reporters that we focus on.

Our empirical analysis in this subsection proceeds by first examining if the general performance trends documented in the daily ETF sample are present for the broader passive sample, while providing evidence on the relative performance of active mutual funds. As preliminary evidence, we split the month-end offerings sample in terciles based on levels of ownership and plot the mean performance. Figure 4 presents the results for passive funds in Panel A and active funds in Panel B. Confirming the results of the prior section bonds with the lowest passive ownership have the best performance through the first month, significantly outperforming bonds with the highest passive ownership. Not only do the offerings with the highest passive ownership have the lowest initial underpricing, but also the offerings begin to underperform after ten trading days. In contrast, the bonds with the highest active mutual fund ownership significantly outperform bonds with the lowest active ownership. The results suggest that active mutual funds, known to trade more frequently and generate information, receive higher allocations in more favorable new offerings.

To test the statistical significance of the findings and to provide broader evidence of the role of all passive funds, we run the follow cross-sectional regressions:

$$Underpricing_{i,r,v,t,y} = \gamma_r + \lambda_y + \beta_1 PassiveOwn_{i,r,v,t,y} + \beta_1 AMFOwn_{i,r,v,t,y} + \beta_2 X_{i,r,v,y} + \epsilon_{i,j,v,r,y}. \quad (9)$$

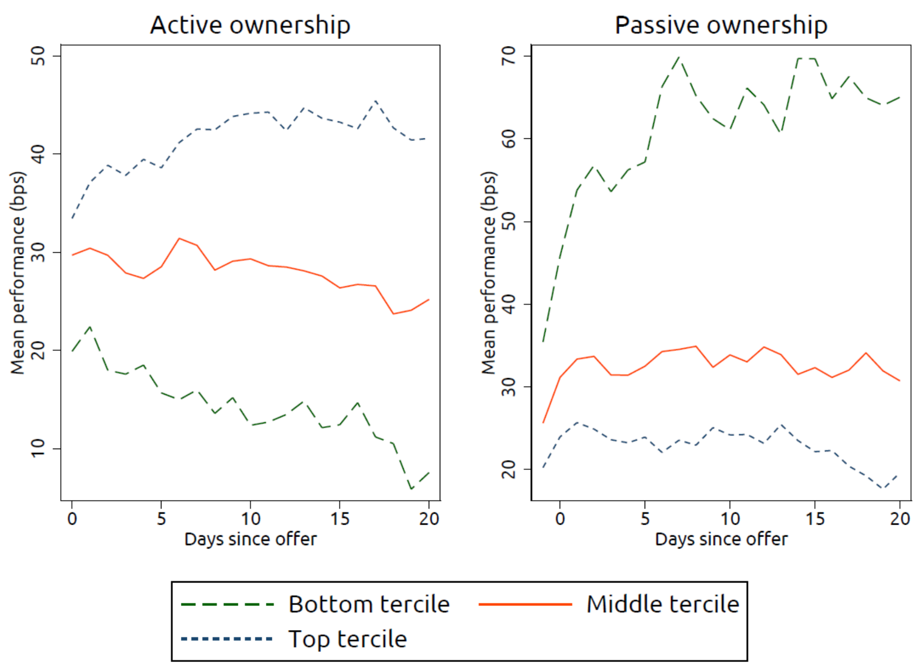


Figure 4. This figure presents the mean bond performance by level of active or passive ownership for bonds issued in the last two trading days of each month. We sort new issue bonds in the monthly sample by ownership and plot the average performance relative the offer price adjusted for the ICE maturity- and rating-matched benchmark returns over the in the days since the issuance. The left presents the results for active funds. The right for passive fund ownership.

The variables of interest are the percentage held by passive funds and active mutual funds of bonds issued on the last two days of each month. Due to limited sample size, we include a dummy to capture industrial issuers rather than including industry fixed effects. Standard errors are clustered at the issuer level. Columns (1) – (3) include just the main covariates of interest, while columns (4) – (6) add controls. Columns (1) and (4) include no fixed effects, columns (2) and (5) just ratings fixed effects, and columns (3) and (6) include both ratings and offering year fixed effects. The results are shown in Table 7.

[Insert Table 7]

Similar to the results in the ETF-only sample, the level of passive ownership is negatively related to the underpricing of the new issue. The results are statistically significant for four of the six specifications. Economically the effects are significant, implying 5.8 percent to 12.3 percent lower underpricing for each one percentage point increase in passive ownership relative to the mean bond in the sample. In contrast, the aggregate ownership of active funds is positively related to underpricing. The effect is statistically significant in each specification. Economically a one percent increase in active mutual fund ownership of a new offer bond implies 5.3 percent to an 8.5 percent greater underpricing relative to the mean bond in the sample.

We continue to examine the short-term and long-term performance of new issuance bonds in the monthly panel in Panel A and Panel B of Table 8. Again confirming the ETF-level findings, the level of passive ownership in a new issue bond is significantly negatively related to its performance through 20 trading days. The effect is both statistically and economically significant for all time periods considered. After twenty trading days a one percentage point increase in passive ownership of a new offering implies 37.7 percent lower returns relative to the mean bond. In contrast, active fund ownership is positively related to new issue bond performance. After twenty trading days a one percentage point increase in passive ownership of a new offering implies 37.7 percent lower returns relative to the mean bond. For active funds the economic effect is 18.4 percent higher returns. The underperformance of new issue bonds more highly allocated to passive funds continues through the first year. In this sample the effect is also statistically significant. In contrast, there is some evidence that new issues with greater allocations to active funds continue to outperform in the market up to twelve months after the offering month. Taken together, the results of this section confirm and expand our conclusions from the ETF-only sample: not only do passive funds have higher holdings in less attractive bonds, but active mutual funds also have higher holdings in higher-performing bonds.[21]

[Insert Table 8]

In practice the primary market holdings are the result of allocations from the underwriting syndicate to fund families and then from the family to its individual funds. First, the underwriter decides how much to allocate to a given fund family (e.g., Vanguard) considering the bookbuilding process and the direct orders from the family, which are submitted collectively. Then in the latter the fund family's internal capital market group decides how to distribute the allocation between its funds. This subsection disentangles if the underperformance we have documented is driven by underwriters, fund family managers, or both using two proxies.

Our proxy for the abnormal allocation to family F by the underwriter is computed as:

$$Abnormal\ To\ Family_{i,F} = \frac{Bonds\ Held_{i,F}}{Offering\ Amount_i} - \frac{Family\ Assets_{F,m}}{Total\ Assets_m} * \frac{\Sigma_{k=1}^{K} Bonds\ Held_{i,k}}{Offering\ Amount_i}. \quad (10)$$

The measure is the deviation of the total ownership of the fund family from the asset-weighted pro-rata allocation of the entire industry's ownership of the offering. We construct our proxy for the abnormal allocation by the family as the difference in family $f's$ actual ownership by passive

[21] In Appendix C we show that the underpricing, short-term and long-term performance results are robust and event statistically stronger using a proxy for abnormal weighting at the industry level to passive funds. The proxy measures the difference between actual passive ownership and our estimate of expected allocation, based on the proportion of total industry assets that are in passive funds. This proxy does not consider the underwriters broad decision to allocate insurance companies, pension funds, mutual funds and ETFs. Rather it takes the aggregate allocation to all investment vehicles in our study and considers deviations from pro-rata standards between active and passive. In other words, any positive deviation from pro-rata AUM is a higher-than-expected allocation to passive funds rather than active funds. Any negative deviation is a lower-than-expected allocation to passive funds in favor of active funds.

funds p and the portion of the family's total ownership predicted by the weight of passive assets in the family. The proxy which we label as abnormal allocation by family is computed as:

$$Abnormal\ By\ Family_{i,F} = \frac{\Sigma_{p=1}^{P} BondsHeld_{i,p,F}}{AmtOutstanding_i} - \frac{\Sigma_{p=1}^{P} Assets_{p,F,m}}{FamilyAssets_{F,m}} * \frac{BondsHeld_{i,F}}{AmtOutstanding_i}. \quad (11)$$

In Table 9 we present the performance results using both measures of abnormal allocation, showing underpricing, short-term returns and long-term returns. We include only fund families with positive passive assets that face the decision of allocation between active and passive funds.[22]

[Insert Table 9]

Both sources of abnormal allocation are significantly negatively related to bond performance, indicating that (1) underwriters are more likely to allocate worse performing bonds to fund families with passive assets compared to other investor types, and (2) these fund families put the worse performing allocations within their passive funds. For the long-term results (shown in columns (6)-(8)), the abnormal allocation by the family are magnitudes larger than the allocation by underwriters suggesting that the internal capital markets effect may dominate. The above results indicate that, while they benefit from positive underpricing in their purchases of new issue bonds, passive investors underperform other investor types in the allocations they receive due to decisions made at the underwriter level and at the fund manager level.

If we make the reasonable assumption that fund managers earn higher fees on active funds than passive funds, then result (2) is consistent with Gaspar et al. (2006), who examine equity IPO allocations within fund families and find IPOs with higher underpricing end up in higher-value funds. Fund families benefit from having a source of persistent primary market demand that is price-insensitive to maintain favoritism from underwriters. Thus, when the deal is of higher quality they allocate to active funds. We conclude by examining if active funds benefit in terms of fund performance by having passive funds in the family. To do so we compute the industry offering amount-weighted average of underpricing in a month, $Underpricing_m$. We also

[22] The results are robust to using all offering-family combinations, including active only families. The results are also robust to considering pro-rata allocations determined by credit quality of the funds to account for the split of assets between investment grade and high yield funds. To proxy for the unmet demand of families we also considered all family-bond observations with non-zero family ownership in the one- and two-months after the issuance. Results are available upon request.

compute proxies for active fund $a's$ performance in month m, $Perf_{j,l,F,m}$. The performance measures we consider include raw returns are used and lipper-category adjusted gross returns. Alpha from factor models is also used. The alpha measures come from a one-factor model using the aggregate fixed income index, a two-factor model with the aggregate fixed income index and the CRSP value-weighted index, and a six-factor model that adds the TERM and DEF factors of Fama and French (1993) and returns to the Bloomberg Investment Grade and the Bloomberg High Yield Indices. To conduct the analysis we run the following regression:

$$Perf_{j,l,F,m} = \alpha_f + \lambda_m + \kappa_{l,m} + \beta_1\left(Underpricing_m * Fam\ Passive_{j,F,t} - 1\right) + \beta_2 Fam\ Passive_{f,F,t-1} + \beta_3 X_{j,l,F,t-1} + \epsilon_{j,l,F,t} \quad (12)$$

Month fixed-effects, λ_m, control for general market conditions in month m. Category-by-date fixed effects, $\kappa_{l,m}$, ensure that we are comparing two funds from the same Lipper class and month. The coefficient of interest β_1 measures if fund performance for a given level of industry primary market underpricing is increasing for active funds from families with passive funds relative to funds from active-only families. The vector of lagged fund-level control variables includes expense ratio, logged fund and family assets under management, and the log of fund age. Table 10 presents the results with standard errors clustered at the fund and date level are presented below the coefficients.

[Insert Table 10]

The interaction is positive and statistically significant suggesting that for a given level of primary market underpricing active funds from families with passive funds outperform their category peers with no passive funds in the family. Further, in months with no underpricing there is no evidence of a statistically significant difference in performance. Thus, we conclude that active fund managers and investors benefit from the primary market demand of the characteristic-driven price-insensitive demand of passive funds in their family.

2.4. Should passive funds stop participating in the primary market for corporate bonds?

Our results have shown (1) that passive funds buy new issue corporate bonds in the primary market, even before the bonds are added to their benchmark index, but (2) the bonds for which they receive allocations are relatively worse than bonds allocated to other investor types, especially active funds. The underperformance by passive funds in the primary market begs the question: should passive funds stop buying new issue bonds? For example, should passive funds wait until a new bond is officially added to its index and buy it in the secondary market?

To address this question, we first look at the price at which passive funds acquire bonds. With our sample of daily reporting ETFs, we are able to identify the dates at which bonds are acquired by the funds, allowing us to estimate the price that ETFs pay for bonds. More specifically, for each bond-ETF pair, we estimate the price paid by the fund for all bonds acquired within the first 60 days of new issue bond's life as follows: (a) holdings on offering date are assumed to be acquired in the primary market at the bond's offering price; (b) all bonds acquired after the offering date are assumed to be purchased at secondary market prices, using the first available price of the following: (i) volume weighted ask price excluding retail trades, (ii) volume-weighted ask price; (iii) volume-weighted trading price excluding retail trades; (iv) volume-weighted trading price; and (v) the weekly average trading price.[23] The final average price for bonds bought after the offering date is the weighted average of the prices described in (b), weighted by the volumes acquired by the fund on each date with bond purchases.

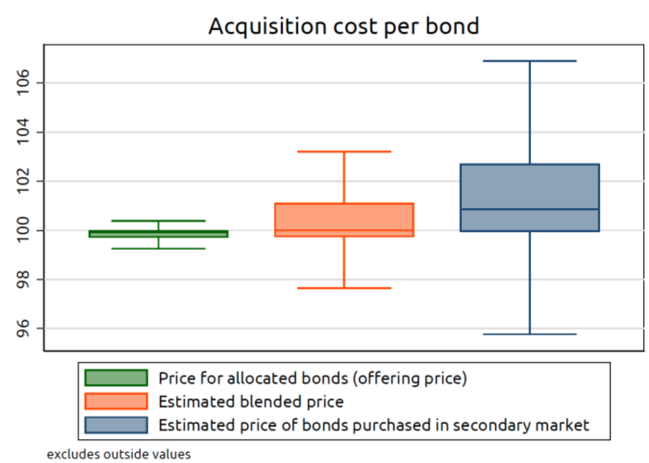


Figure 5. Each boxplot shows the distribution of prices in three categories: the offering price of bonds in our sample (green, left); the estimated acquisition price of bonds by ETFs in the secondary market (blue, right); and the blended price (orange price, middle), which is the average of the other two prices weighted by estimated acquisition volume.

[23] ETFs can acquire bonds on dates with no volume in TRACE because of the ETF creation mechanism, which does not cross TRACE. In this case, we are assuming the bond's price in the creation basket is determined using the week's average trading price.

The results of this estimation are shown in Figure 5. Shown in green on the left is the distribution of offering prices described in the previous paragraph in (a), which is narrowly centered around 100% of par value. Shown in blue on the right is the distribution of the weighted average secondary market price for each bond-ETF pair, described above in (b). Shown in orange in the middle is the distribution of the final blended price for the bond-ETF pair: the number of bonds acquired on offering date multiplied by the offering price plus the number of bonds acquired in the secondary market at the weighted average purchase price, divided by the total number of bonds acquired on offering date and in the secondary market.

The distribution of blended price paid by the ETFs (in orange) is generally lower than the distribution of weighted average secondary market prices (in blue); this is not surprising, as we showed in Table 3 that ETFs still receive positive underpricing on average, even if they receive more bonds with the lowest underpricing. While passive funds would have better returns if they received more bonds in the primary market (as evidenced by the fact that the offering price in green is lower than the blended price by ETFs in orange), we show in Figure 5 that overall returns for passive funds would be worse if they stopped participating in the primary market.

But it is likely that passive fund managers are not solely focused on the price at which they acquire bonds. In fact, given their mandate of tracking an index, the 'optimal' price for acquisition may be the price at which the bond enters the index, minimizing the fund's tracking error – for example, the fund may prefer acquiring a new bond on rebalancing date at that day's trading price. But another defining feature of the corporate bond market is limited trading liquidity, especially after the first 10 trading days (Goldstein et al., 2021). In order to gauge the benefit of acquiring bonds in the primary market without worrying about secondary market liquidity (as discussed in Flanagan et al., 2021), for each bond we compare the number of bonds held by all ETFs on the offer date to the trading volume on the rebalancing date where the bond enters the index (the first day of the month after issuance). The distribution of this ratio is plotted in Figure 6 with the x-axis shown on a log scale.

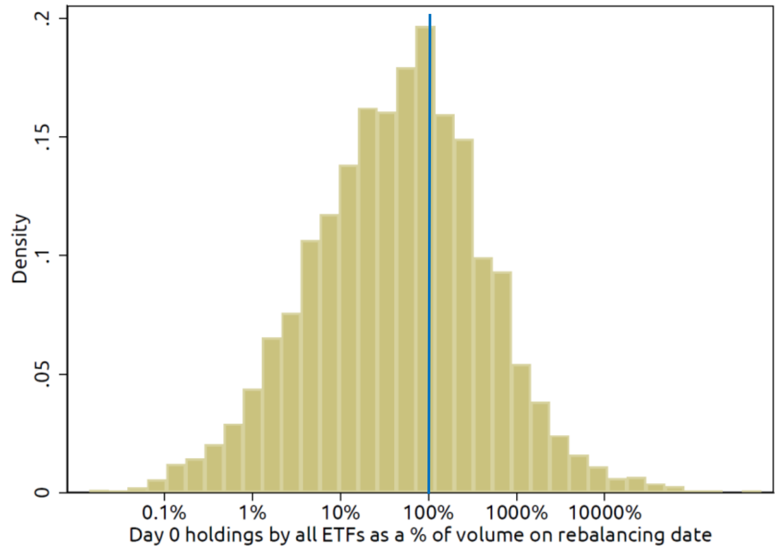


Figure 6. For each bond, we calculate the ratio of total offer date holdings by all ETFs to the trading volume on the first day of the following month (the estimated date that the bond is added to indexes). This figure plots the distribution of the ratio, with the x-axis shown on a log scale.

The blue line indicates a ratio of 100%: for approximately 1/3 of the bonds in our sample (the density to the right of the blue line), ETFs' holdings on offer date *exceed* the total trading volume of the bond on rebalancing date. In other words, there were not enough bonds that were sold on rebalancing date to match the bonds ETFs acquired in the primary market in a significant part of the sample. This likely undersells the market access problem. Say for illustration that ETFs held $9 million of a bond on issue date and that bond traded $10 million on rebalancing date; while in theory ETF offer date holdings could have been acquired on rebalancing date, this would require the ETFs to either be 90% of the day's trading volume or would require trading volume to increase 90%. While the counterfactual trading volume is impossible to measure, we believe that either alternative is unlikely, and the ETFs would end up with fewer bonds if they did not purchase in the secondary market.

These figures show that, even if passive funds only receive allocations of the worst-performing bonds, slightly positive underpricing and access to bonds outside of the illiquid secondary market mean that it is optimal for passive funds to participate in the primary market for corporate bonds. Because fund managers are acting optimally, it suggests that perhaps in the fixed income market, investors are not better off investing solely in the asset class via passive vehicles, a conclusion in line with Choi et al. (2023).

3. Conclusion

Using the corporate bond market as a laboratory, our paper shows the presence of passive investors in primary markets has important welfare implications for underwriters, firms, investors, and fund families. Using two datasets we show that passive funds participate in primary offerings, before the bond's inclusion in benchmark indexes. We find that passive investors have higher holdings in less attractive new issues, particularly those with lower underpricing. Exploiting the illiquidity of corporate bond markets, we are able to attribute these offer day holdings to allocations rather than secondary market purchases or ETF primary market activity.

Further, we find that the bonds held more by passive funds have less demand and are lower quality. Specifically, using bookbuilding data we present evidence that passive holdings are higher in deals that are downsized and have lower spread compression and subscription rates. Further, the bonds are more likely to be cold offerings and to be downgraded and less likely to be upgraded. The underperformance continues over the first month and year of trading. Thus, we conclude that passive funds serve as a backstop to complete deals with weak primary market demand that would be unlikely to be completed at the final deal terms without their characteristic-driven price-insensitive demand. In contrast, we find that active funds have higher offering date holdings of bonds with greater underpricing, short-term, and long-term performance. The placement of these underperforming new issues into passive funds is due to a combination of underwriter overallocation to passive families and within family overallocation to passive funds.

There are important regulatory implications of our finding that passive investors underperform in the $2.3 trillion new issue bond market (SIFMA, 2021). Passive investors demand is used by underwriters to complete offerings without sufficient demand from active investors suggesting the growth of passive assets has facilitated the completion of issuances that otherwise would have failed. Firms benefit by way of increased market access or more attractive bond terms, and underwriters by avoiding the reputational risk of cancelling a deal. Families with passive assets generate repeat demand for offerings, which benefits their higher fee-paying active funds and investors. For passive funds primary market participation is the optimal decision, allowing them to partially avoid illiquid secondary market to obtain the bond, and to realize the on average positive underpricing which can offset any negative tracking error or be used to reduce investor expenses. In the long-term the effect on tracking error is likely inconsequential since the bond is included in the index. However, if funds use representative sampling by holdings hold a subset of index constituents the long-term underperformance alludes to the hidden cost of Reilly (2022).

References

Appel, I. R., T. A. Gormley, and D. B. Keim (2016). Passive investors, not passive owners. *Journal of Financial Economics 121*(1), 111–141.

Bali, T. G., A. Subrahmanyam, and Q. Wen (2021). Long-term reversals in the corporate bond market. *Journal of Financial Economics 139*(2), 656–677.

Bao, J., M. O'Hara, and X. A. Zhou (2018). The Volcker Rule and corporate bond market-making in times of stress. *Journal of Financial Economics 130*(1), 95–113.

Benveniste, L. M. and P. A. Spindt (1989). How investment bankers determine the offer price and allocation of new issues. *Journal of Financial Economics 24*(2), 343–361.

Bessembinder, H., S. E. Jacobsen, W. F. Maxwell, and K. Venkataram (2021). Syndicate structure, primary allocations, and secondary market outcomes in corporate bond offerings. *Working Paper*.

Bessembinder, H., K. M. Kahle, W. F. Maxwell, and D. Xu (2009). Measuring abnormal bond performance. *Review of Financial Studies 22*(10), 4219–4258.

Busse, J. A. and Q. Tong (2012). Mutual fund industry selection and persistence. *The Review of Asset Pricing Studies 2*(2), 245–274.

Cai, N. K., J. Helwege, and A. Warga (2007). Underpricing in the corporate bond market. *The Review of Financial Studies 20*(6), 2021–2046.

Calomiris, C. W., Larrain, M., Schmukler, S. L., & Williams, T. (2022). Large international corporate bonds: Investor behavior and firm responses. *Journal of International Economics*, *137*, 103624.

Chava, S., P. Kumar, and A. Warga (2010). Managerial agency and bond covenants. *Review of Financial Studies 23*(3), 1120–1148.

Choi, J., M. Cremers, and T.B. Riley (2023). Passive fund management is an oxymoron (or the case for active management of bond funds). *Working Paper.*

Cici, G., S. Gibson, N. Qin, A. Zhang (2023). The performance of corporate bond mutual funds and the allocation of underpriced new issues. *Working Paper.*

Cornelli, F. and D. Goldreich (2001). Bookbuilding and strategic allocation. *Journal of Finance 56*(6), 2337–2369.

Dannhauser, C. D. (2017). The impact of innovation: Evidence from corporate bond exchange-traded funds (ETFs). *Journal of Financial Economics 125*(3), 537–560.

Dannhauser, C. D. and S. Hoseinzade (2022). The unintended consequences of corporate bond ETFs: Evidence from the taper tantrum. *Review of Financial Studies 35*(1), 51–90.

Dathan, M. and S. Davydenko (2020). Debt issuance in the era of passive investment. *Working Paper*.

Dick-Nielsen, J. (2014). How to clean Enhanced TRACE data. *Working Paper.*

Dick-Nielsen, J., P. Feldhutter, L. H. Pedersen, and C. Stolborg (2023). Corporate bond factors: Replication failures and a new framework. *Working Paper*.

Dick-Nielsen, J. and M. Rossi (2019). The cost of immediacy for corporate bonds. *The Review of Financial Studies 32*(1), 1–41.

ETFTrends (September 16, 2021). Active managers taking market share from passive funds with IPOs. *NASDAQ*.

Evans, K. P., W. S. Leung, J. Li, and K. Mazouz (2023). ETF ownership and seasoned equity offerings. *Journal of Financial and Quantitative Analysis*, 1–28.

Flanagan, T., S. Kedia, and X. A. Zhou (2021). Assessing gains from primary market allocations in corporate bonds. *Working Paper*.

Gaspar, J.-M., M. Massa, and P. Matos (2006). Favoritism in mutual fund families? Evidence on strategic cross-fund subsidization. *Journal of Finance 61*(1), 73–104.

Goldstein, M. A., E. S. Hotchkiss, and S. Nikolova (2021). Dealer behavior and the trading of newly issued corporate bonds. *Working Paper*.

Handler, L., R. Jankowitsch, and P. Weiss (2021). Covenant prices of US corporate bonds. *Working Paper*.

Holden, C. W. and J. Nam (2022). Market accessibility, corporate bond ETFs, and liquidity. *Working Paper*.

Hotchkiss, E.S., H. Sun, L. Wang, and Y.Zhao (2024). Firms' response to credit supply: Evidence from upsized corporate bond offerings. *Working Paper.*

Iliev, P. and M. Lowry (2015). Are mutual funds active voters? *The Review of Financial Studies 28*(2), 446–485.

Investment Company Institute (2021). 2021 Investment Company Fact Book.

Jenkinson, T. and H. Jones (2004). Bids and allocations in European IPO bookbuilding. *Journal of Finance 59*(5), 2309–2338.

Koijen, R. S. and M. Yogo (2023). Understanding the ownership structure of corporate bonds. *American Economic Review: Insights 5*(1), 73–92.

Koont, N., Y. Ma, L. Pastor, and Y. Zeng (2022). Steering a ship in illiquid waters: Active management of passive funds. *NBER Working Paper* (W30039).

Krigman, L., W.H. Shaw, K.L. Womack (1999). The persistence of IPO mispricing and the predictive power of flipping. *Journal of Finance 54*(3), 1015-1044.

Loughran, T. and J. R. Ritter (2004). Why has IPO underpricing changed over time? *Financial Management 33*(3), 5–37.

Marta, T. (2021). Fixed income ETFs, bond liquidity, and stressed markets. *Working Paper*.

Nagler, F. and G. Ottonello (2022). Inventory-constrained underwriters and corporate bond offerings. *The Review of Asset Pricing Studies 12*(3), 639–666.

Nikolova, S. and L. Wang (2022). Corporate bond flipping. *Working Paper*.

Nikolova, S., L. Wang, and J. J. Wu (2020). Institutional allocations in the primary market for corporate bonds. *Journal of Financial Economics 137* (2), 470–490.

Reilly, C. (2022). The hidden cost of corporate bond ETFs. *Working Paper*.

Reuter, J. (2006). Are IPO allocations for sale? Evidence from mutual funds. *Journal of Finance 61*(5), 2289–2324.

Ritter, J. R. and D. Zhang (2007). Affiliated mutual funds and the allocation of initial public offerings. *Journal of Financial Economics 86*(2), 337–368.

Rock, K. (1986). Why new issues are underpriced. *Journal of Financial Economics 15*(1-2), 187–212.

Sherman, A. E. and S. Titman (2002). Building the IPO order book: underpricing and participation limits with costly information. *Journal of Financial Economics 65*(1), 3–29.

Shim, J. J. and K. Todorov (2023). ETFs, illiquid assets, and fire sales. *University of Notre Dame Working Paper*.

Siani, K. (2022). Raising bond capital in segmented markets. *Working Paper*.

SIFMA (2021). 2021 Capital Markets Fact Book.

Wang, L. (2021). Lifting the veil: The price formation of corporate bond offerings. *Journal of Financial Economics 142*(3), 1340–1358.

Table 1

Daily ETF sample summary statistics

This table presents the summary statistics for the daily ETF sample from January 2015-December 2020. Panel A documents the characteristics of the corporate bond new issuances in our sample. The bond characteristics include the offering amount in millions of dollars and the time to maturity at offering. Rating is the median rating of the bond from the three main ratings agencies (AAA=1, AA+=2, etc.). Panel B presents summary statistics on the performance of the new issue bonds in the sample. Underpricing is the first observed return relative to the offer price, requiring it to be within five days of the offering date. Return to offer is the excess return of the bond's return from its offering price in the first twenty trading days relative to the maturity- and rating-matched ICE index return over the same period. CAR is the cumulative monthly return of the new issue over the first twelve months. The return of a new issue is the RET_L5M obtained from WRDS in excess of the maturity- and rating-matched ICE index return over the same period. Missing excess returns are assumed to be zero. Panel C presents the statistics on the holdings of the subsample of ETFs that report daily.

Panel A: Bond characteristics	Count	Mean	Median	Std dev
Offering amount ($M)	7,089	791.00	600.00	653.00
Time to maturity (years)	7,089	11.61	8.63	9.42
Rating	6,954	9.46	9.00	3.66
First year upgrade dummy (%)	6,912	11.73		32.18
First year downgrade dummy (%)	6,912	13.99		34.69

Panel B: Performance statistics	Count	Mean	Median	Std dev
Underpricing (%)	4,407	0.34	0.21	0.99
Cold offering dummy (%)	4,407	26.89	0.00	44.34
Return from Offer (%)				
Day 0	4,317	0.33	0.21	0.96
Day 1	4,397	0.43	0.28	1.17
Day 2	4,407	0.49	0.28	1.42
Day 5	4,418	0.57	0.28	1.85
Day 10	4,426	0.65	0.28	2.20
Day 20	4,435	0.68	0.24	2.56
CAR (%)				
Month 1	4,338	-0.22	-0.13	1.62
Month 2	4,338	-0.61	-0.46	2.54
Month 3	4,338	-0.89	-0.75	2.41
Month 6	4,338	-1.85	-1.62	3.36
Month 9	4,338	-2.77	-2.43	4.14
Month 12	4,338	-3.56	-3.11	4.46

Panel C: Holding variables	Count	Mean	Median	Std dev
Offer date holding (%) - all ETFs	7,089	0.54	0.28	0.73
All bonds in ETF index				
Offer date holding (%) - ETF level	52,058	0.07	0.00	0.23
First day of holding	35,137	28.70	0.0	65.20
All bonds held within 60 days				
Offer date holding (%) - ETF level	30,473	0.13	0.01	0.29
First day of holding	30,473	6.80	0.0	13.50

Table 2

Underpricing and ETF offering day holdings

This table presents the results of regression of underpricing on the portion of a new issuance held by individual ETFs. The dependent variable is the index-adjusted first trading day return on a corporate bond. $Offer\ date\ holding$ is an ETF's holding of a corporate bond on the offer date; the sample includes only bonds that are estimated to be included in an ETF's index. All columns include ratings fixed effects, and column (3) also includes ETF, year and industry fixed effects. Standard errors double clustered at the issuer and month level are reported below the coefficients. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1) Underpricing	(2) Underpricing	(3) Underpricing
Offer date holding %	-21.24***	-10.36***	-15.76***
	(5.687)	(3.239)	(4.132)
Log of bond size		0.0647	0.0345**
		(0.0415)	(0.0160)
Log of bond time to maturity		0.252***	0.262***
		(0.0596)	(0.0580)
Observations	38,631	38,631	38,631
R-Squared	0.010	0.053	0.083
Sample	All bonds in index	All bonds in index	All bonds in index
Constant	Yes	Yes	Yes
Rating bucket FE	Yes	Yes	Yes
ETF FE	No	No	Yes
Year FE	No	No	Yes
Industry FE	No	No	Yes
Cluster	Issuer & Month	Issuer & Month	Issuer & Month

Table 3
Performance of bonds with and without allocations

Sample mean variables for various subsets of bonds: the full sample (column 1), bonds where no ETFs held on offer date (column 2), bonds where total ETF offer date holdings exceeded offer day ask volume (column 3), bonds where volume held by ETFs on offer date exceeded creation volume (column 4), and bonds where both the conditions in column 3 and 4 are both met (column 5). The final column shows the difference in sample means of column 2 and column 5. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	All bonds	Non-allocated bonds	Bonds not purchased in secondary market on offer day	Bonds not received by creation on offer day	Bonds not purchased in secondary market or received by creation on offer day	Underperformance by ETFs: Difference between (5) and (2)
Number of observations	4,407	394	834	1,078	182	
Underpricing	0.34%	0.83%	0.10%	0.36%	0.16%	-0.66%***
Daily CAAR 0	0.33%	0.81%	0.08%	0.35%	0.10%	-0.70%***
Daily CAAR 1	0.43%	1.09%	0.16%	0.41%	0.23%	-0.86%***
Daily CAAR 2	0.49%	1.42%	0.18%	0.44%	0.25%	-1.18%***
Daily CAAR 5	0.57%	1.95%	0.15%	0.53%	0.35%	-1.61%***
Daily CAAR 10	0.65%	2.31%	0.12%	0.56%	0.27%	-2.04%***
Daily CAAR 20	0.68%	2.19%	0.12%	0.59%	0.37%	-1.82%***

Table 4
Bookbuilding demand and ETF offering day holdings

This table presents the results of regressions of bookbuilding demand proxies on the holdings by individual ETFs on a corporate bond's offering date. Columns (1) and (2) present the results of linear probability models with the dependent variables being dummies equal to one if a bond offering size decreases or increases, respectively, between the announcement and pricing of the deal. Column (3) uses $Spread\ Compression$, the difference between the announced spread to Treasury bonds and the final realized spread as the dependent variable. Column (4) uses the subscription rate, which is the total amount demanded from investors over the offering size. Standard errors clustered at the issuer level are reported below the coefficients. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)
	Downsize	Upsize	Spread Compression	Subscription Rate
Offer date holding %	20.531***	-3.327	218.552**	-127.952***
	(7.591)	(5.447)	(104.706)	(3,4.997)
Observations	23,538	24,603	21,224	2,260
R-Squared			0.085	0.208
Controls	Yes	Yes	Yes	Yes
Rating bucket FE	Yes	Yes	Yes	Yes
ETF FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Rule 144A Dummy	Yes	Yes	Yes	Yes
Cluster	Issuer	Issuer	Issuer	Issuer

Table 5

Post pricing evidence of deal quality

This table presents the result of our study of post pricing variables as evidence of primary market demand an quality. Panel A presents the results of linear probability models for the probability of a cold offering (e.g. negative underpricing) in Column (1) and for a downgrade In Column (2) or upgrade in Column (3) by one of the three main ratings agencies in the first calendar year. Panel B presents the performance for short-term returns relative to the offering price in the 1, 2, 5, 10, and 20 days after issuance. Panel C presents the findings for the cumulative-adjusted returns, CAR, of the new issue over the first twelve months. The return of a new issue is the RET_L5M obtained from WRDS in excess of the maturity- and rating-matched ICE index return over the same period. Missing excess returns are assumed to be zero. Standard errors double clustered at the issuer and month level are reported below the coefficients. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)
Panel A: Deal quality	Cold Offering	Downgrade	Upgrade
Offer date holding %	5.321**	1.793*	-1.977*
	(2.079)	(0.954)	(1.141)
Log of bond size	-0.013	0.073***	-0.008
	(0.013)	(0.019)	(0.010)
Log of bond time to maturity	-0.039***	-0.021***	0.008
	(0.010)	(0.006)	(0.006)
Observations	38,631	51,364	51,364
R-Squared	0.043	0.083	0.062
Sample	All bonds in index	All bonds in index	All bonds in index
Constant	Yes	Yes	Yes
Rating bucket FE	Yes	Yes	Yes
ETF FE	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Cluster	Issuer & Month	Issuer & Month	Issuer & Month

	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Short-term performance	Day 0	Day 1	Day 2	Day 5	Day 10	Day 20
Offer date holding %	-16.06***	-20.84**	-26.20***	-37.76**	-43.92**	-50.10**
	(4.525)	(7.592)	(8.964)	(15.03)	(18.66)	(19.71)
Log of bond size	0.035**	0.076**	0.061	0.084	0.180*	0.243***
	(0.015)	(0.034)	(0.049)	(0.068)	(0.103)	(0.070)
Log of bond time to maturity	0.260***	0.321***	0.375***	0.485***	0.598***	0.649***
	(0.059)	(0.080)	(0.090)	(0.142)	(0.156)	(0.151)
Observations	38,182	38,578	38,628	38,675	38,700	38,752
R-Squared	0.083	0.107	0.136	0.100	0.115	0.113
Sample	All bonds in index	All bonds in index	All bonds in index	All bonds in index	All bonds in index	All bonds in index
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Rating bucket FE	Yes	Yes	Yes	Yes	Yes	Yes
ETF FE	Yes	Yes	Yes	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Issuer & Month	Issuer & Month	Issuer & Month	Issuer & Month	Issuer & Month	Issuer & Month

Panel C: Long-term performance	(1) Month 1	(2) Month 2	(3) Month3	(4) Month 6	(5) Month 9	(6) Month 12
Offer date holding %	-9.145	-4.099	-8.066	-17.67	-15.40	-20.87
	(10.68)	(10.46)	(11.40)	(16.45)	(11.14)	(15.67)
Log of bond size	0.062	-0.064	-0.144	-0.291	-0.598**	-1.000***
	(0.102)	(0.117)	(0.100)	(0.210)	(0.237)	(0.288)
Log of bond time to maturity	-0.012	-0.166**	-0.293***	-0.637***	-0.940***	-1.119***
	(0.052)	(0.077)	(0.081)	(0.139)	(0.148)	(0.139)
Observations	38,610	38,610	38,610	38,610	38,610	38,610
R-Squared	0.027	0.053	0.060	0.055	0.078	0.088
Sample	All bonds in index	All bonds in index	All bonds in index	All bonds in index	All bonds in index	All bonds in index
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Rating bucket FE	Yes	Yes	Yes	Yes	Yes	Yes
ETF FE	Yes	Yes	Yes	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Issuer & Month	Issuer & Month	Issuer & Month	Issuer & Month	Issuer & Month	Issuer & Month

Table 6

Summary statistics: Month-end offerings

This table presents summary statistics by offering year of the sample of bonds offered on the last two trading days of a month between January 2011 and December 2020. Panel A documents ownership as a percentage of the offering amount by different investment vehicles and the characteristics of the new offerings. % AMF is the ownership of active mutual funds, % IMF by index mutual funds, and % ETF by exchange-traded funds (ETFs). % Passive is the combined ownership of index mutual funds and ETFs. The bond characteristics include the offering amount in millions of dollars and the time to maturity at offering. Industrial is a dummy variable if the issuer of the bond is in the industrial industry according to FISD industry group. Rating is the median rating of the bond from the three main ratings agencies (AAA=1, AA+=2, etc.). Panel B presents summary statistics on the performance of the new issue bonds in the sample. Underpricing is the first observed return relative to the offer price, requiring it to be within five days of the offering date. Return to offer is the excess return of the bond's return from its offering price in the first twenty trading days relative to the maturity- and rating-matched ICE index return over the same period. CAR is the cumulative monthly return of the new issue over the first twelve months. The return of a new issue is the RET_L5M obtained from WRDS in excess of the maturity- and rating-matched ICE index return over the same period. Missing excess returns are assumed to be zero.

Panel A: Bond Characteristics

	# Obs	Mean	Median	Stdev
% AMF	580	4.48	2.92	4.77
% IMF	580	1.064	0.54	1.32
% ETF	580	0.78	0.42	0.99
% Passive	580	1.85	1.22	2.06
Time to maturity (years)	580	12.83	10.01	10.52
Offering amount ($M)	580	845.06	600.00	755.85
Rating	580	0.66	1.00	0.47
Industrial	559	7.80	8.00	2.99
144A	580	4.48	2.92	4.77

Panel B: Performance summary statistics month-end sample

	# Obs	Mean	Median	Stdev
Underpricing (%)	587	0.397	0.226	0.816
Return from Offer (%)				
Day 0	569	0.392	0.222	0.804
Day 1	558	0.427	0.249	0.892
Day 2	523	0.465	0.269	1.026
Day 5	501	0.397	0.233	1.253
Day 10	457	0.527	0.213	1.981
Day 20	459	0.692	0.190	2.491
CAR (%)				
Month 1	557	0.329	0.000	2.041
Month 2	557	0.067	-0.158	2.135
Month 3	557	-0.322	-0.487	2.159
Month 6	557	-1.306	-1.351	2.733
Month 9	557	-0.373	-0.561	3.635
Month 12	557	-0.902	-0.835	4.487

Table 7

Underpricing: Month-end offerings

The dependent variable is the index-adjusted first trading day return on a corporate bond, underpricing Issuance month holdings of active mutual funds (% AMF) and passive funds, index mutual funds and ETFs (% Passive) are computed as a percent of the bond's offering amount. Control variables used in Columns (4) – (6) include the log of amount outstanding and the bond time to maturity at issuance, and an indicator variable for bonds from industrial issuers. Columns (1) and (3) use no fixed effects. Columns (2) and (5) use only ratings fixed effects. Columns (3) and (6) use ratings and offering year fixed effects. Standard errors clustered at the issuer level are presented below the coefficients. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% Passive	-4.279***	-4.487**	-4.946*	-5.282*	-3.094**	-2.685*	-2.157	-2.569
	(1.611)	(1.829)	(2.631)	(2.699)	(1.504)	(1.569)	(2.327)	(2.372)
% AMF	2.759**	2.648**	2.086**	1.940*	3.296***	3.161***	2.746***	2.723***
	(1.198)	(1.227)	(0.963)	(1.014)	(1.267)	(1.153)	(0.944)	(0.997)
Log of bond size					-4.048	-7.325	-8.318	-10.507
					(10.027)	(9.483)	(9.457)	(9.439)
Log of bond time to maturity					1.879***	2.082***	2.054***	1.921***
					(0.480)	(0.493)	(0.418)	(0.415)
Observations	548	548	548	547	548	548	548	547
R-squared	0.044	0.098	0.110	0.136	0.108	0.173	0.180	0.197
Ratings FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Offering Year FE	No	No	Yes	Yes	No	No	Yes	Yes
Industry FE	No	No	No	Yes	No	No	No	Yes
Cluster	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer

Table 8

Short- and long-term performance: Month-end offerings

This table presents the results of short-term and long-term in performance of bonds issued on the last two-trading days of the month. In Panel A the dependent variable is the return from the offering price in basis points in excess of the maturity- and category-matched ICE benchmark over the same period. The dependent variable in Panel B is the cumulative abnormal return in basis points of the bond relative in excess of the maturity- and category-matched ICE benchmark over the same period. Issuance month holdings of active mutual funds (% AMF) and passive funds, index mutual funds and ETFs (% Passive) are computed as a percent of the bond's offering amount. Control variables include the log of amount outstanding and the time to maturity at issuance, and an indicator variable for bonds from industrial issuers. The regressions include ratings and offering year fixed effects. Standard errors clustered at the issuer level are presented below the coefficients. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Short-term	Day 0	Day 1	Day 2	Day 5	Day 10	Day 20
% Passive	-2.756	-4.576*	-8.880***	-10.847***	-19.159***	-26.624***
	(2.422)	(2.526)	(3.052)	(3.645)	(6.912)	(6.882)
% AMF	2.737***	3.611***	3.905***	6.137***	10.479***	12.480***
	(0.990)	(1.269)	(1.464)	(1.281)	(2.626)	(3.021)
Log of bond size	-10.382	-5.877	0.077	4.664	22.475	49.493
	(9.597)	(8.240)	(10.438)	(8.807)	(14.929)	(30.866)
Log of bond time to maturity	1.886***	2.211***	2.364***	2.105***	3.328**	4.809***
	(0.415)	(0.488)	(0.602)	(0.796)	(1.337)	(1.446)
Observations	537	545	515	491	452	453
R-squared	0.194	0.227	0.211	0.199	0.218	0.321
Ratings FE	Yes	Yes	Yes	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer

Panel B: Long-term	(1) Month 1	(2) Month 2	(3) Month3	(4) Month 6	(5) Month 9	(6) Month 12
% Passive	-16.754***	-19.760***	-13.691***	-15.392**	-16.791	-30.704**
	(5.020)	(6.504)	(5.140)	(7.280)	(10.761)	(12.886)
% AMF	5.574**	4.443	5.507**	5.922	7.288	10.727*
	(2.632)	(3.630)	(2.610)	(3.605)	(5.577)	(6.328)
Log of bond size	67.001**	74.363*	15.581	30.216	5.671	-44.966
	(30.478)	(37.955)	(21.170)	(43.241)	(79.010)	(87.842)
Log of bond time to maturity	1.906*	1.422	0.938	-0.536	-2.585	-6.292***
	(1.141)	(1.109)	(1.023)	(1.392)	(1.783)	(2.259)
Observations	551	551	551	551	551	551
R-squared	0.256	0.190	0.164	0.152	0.130	0.083
Ratings FE	Yes	Yes	Yes	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer

Table 9

Performance and abnormal allocations to passive families by underwriters and by families to passive funds

This table presents the results of regressions of performance measures for bond issuances in the last two trading days of a month on a proxy for deviations from pro-rata allocations to passive families by underwriters and by passive families to passive funds. The sample includes observations of new issuance holdings by families with positive passive fund assets. *Abnormal to Family* proxies for the abnormal allocation to all funds in family f from underwriters. It is computed for family f for bond i issued in month m as the difference between actual family ownership and the asset-weighted proportional ownership to the family of the total allocation to all bond funds: To proxy for the abnormal allocation by the family to its passive funds, p, we compute, *Abnormal by Family.* It is computed for family f for bond i issued in month m for as the difference between actual ownership of passive funds in the family and the asset-weighted proportional ownership to the passive funds of the total allocation to the family: Panel A presents the underpricing results, Panel B the short-term performance, and Panel C the long-term performance. Control variables including the log of offering amount, log of bond time to maturity, and an indicator variable for an issuance from an industrial issuer are used when indicated. Fixed effects for ratings, offering year, and family are used where indicated. Standard errors clustered at the issuer level are presented below the coefficients. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)
Panel A: Underpricing	Underpricing	Underpricing	Underpricing	Underpricing
Abnormal to Family	-4.265***	-6.216***	-3.642***	-5.544***
	(1.592)	(2.238)	(1.176)	(1.727)
Abnormal by Family	-4.774	-6.508*	-4.358*	-5.908**
	(2.998)	(3.329)	(2.353)	(2.539)
Observations	2,834	2,831	2,834	2,831
R-squared	0.207	0.243	0.260	0.293
Controls	No	No	Yes	Yes
Ratings FE	Yes	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Family FE	No	Yes	No	Yes
Cluster	Issuer	Issuer	Issuer	Issuer

	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Short-term	Day 0	Day 1	Day 2	Day 5	Day 10	Day 20
Abnormal to Family	-5.771***	-7.099***	-7.831***	-9.932***	-17.728***	-15.206**
	(1.774)	(2.000)	(2.405)	(2.816)	(4.889)	(6.628)
Abnormal by Family	-5.923**	-9.577***	-11.687**	-19.961***	-34.703***	-40.786***
	(2.538)	(3.402)	(4.632)	(6.502)	(10.880)	(10.208)
Observations	2,800	2,827	2,739	2,680	2,522	2,530
R-squared	0.293	0.281	0.247	0.232	0.282	0.359
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Ratings FE	Yes	Yes	Yes	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer

	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Long-term	Month 1	Month 2	Month3	Month 6	Month 9	Month 12
Abnormal to Family	-6.602	-8.524*	-8.546**	-3.201	2.081	-7.656
	(4.251)	(4.897)	(4.069)	(5.539)	(8.746)	(10.196)
Abnormal by Family	-19.051**	-17.194	-13.841	-19.111	-28.619*	-37.932*
	(8.150)	(13.022)	(9.922)	(12.857)	(16.875)	(21.644)
Observations	2,831	2,831	2,831	2,831	2,831	2,831
R-squared	0.325	0.222	0.189	0.160	0.151	0.082
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Ratings FE	Yes	Yes	Yes	Yes	Yes	Yes
Offering Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Family FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Issuer	Issuer	Issuer	Issuer	Issuer	Issuer

Table 10

Impact on Active Fund Returns

This table presents the results of the following monthly regressions for fund j, in lipper category style c, from family F, in month t

$$Perf_{j,l,F,t} = \alpha_f + \lambda_t + \gamma_{l,t} + \beta_1(Underpricing_t * Fam\ Passive_{j,F,t} - 1) + \beta_2 Fam\ Passive_{f,F,t-1} + \beta_3 X_{j,l,F,t-1} + \epsilon_{j,l,F,t}$$

The dependent variable is one of four proxies for performance. In column (1) raw returns are used and column (2) lipper-category adjusted gross returns. Alpha from factor models are used in columns (3) – (5). A one-factor model using the aggregate fixed income index is used in column (3), a two-factor model with the aggregate fixed income index and the CRSP value-weighted index is used in column (4), and column (5) adds the TERM and DEF factors of Fama and French (1993) and returns to the Bloomberg Investment Grade and the Bloomberg High Yield Indices. All specifications include fund fixed effects α_f, year-month fixed effects, λ_t, and lipper-category-by-month fixed effects $\gamma_{c,t}$. The key covariate of interest is the interaction between the offering amount weighted underpricing of all new issuances in month t and the dummy equal to one if a family have passive assets, and zero otherwise. The vector of controls includes the log of fund and family assets, the log of fund age, and the expense ratio. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)	(5)
	Raw Return	Cat-adj. Gross	alpha1	alpha2	alpha6
Underpricing (t) * Fam Passive (t-1)	0.505***	0.506***	0.316*	1.105***	1.197***
	(0.186)	(0.186)	(0.172)	(0.232)	(0.245)
Fam Passive (t-1)	-1.726	-1.731	-0.569	-0.998	-0.195
	(1.220)	(1.220)	(1.278)	(1.138)	(1.459)
Exp Ratio (t-1)	1.643	9.867***	3.448**	-0.543	-0.127
	(1.731)	(1.731)	(1.619)	(1.221)	(1.420)
Log(Age) (t-1)	-0.795	-0.793	2.540**	-1.493*	-1.229
	(0.806)	(0.806)	(0.985)	(0.792)	(0.947)
Log(Assets) (t-1)	-0.000	0.000	-0.702*	0.586	0.739*
	(0.355)	(0.354)	(0.421)	(0.380)	(0.397)
Log(Fam Assets) (t-1)	1.658***	1.650***	1.230***	0.641**	0.633*
	(0.363)	(0.363)	(0.346)	(0.306)	(0.366)
Observations	180,735	180,735	180,735	133,871	133,856
R-squared	0.891	0.022	0.890	0.712	0.688
Fund FE	No	No	No	No	No
Date FE	Yes	Yes	Yes	Yes	Yes
Category-by-Date FE	Yes	Yes	Yes	Yes	Yes
Cluster	Fund & Date	Fund & Date	Fund & Date	Fund & Date	Fund & Date

Appendix A – Overview of ETF sample with daily holdings

*indicates the ETF holds non-corporate bonds as part of its mandate.

ETF Ticker	Manager	Name	Rating Category	Maturity Category	Benchmark Index Provider	AUM in billions (YE 2021)
AGG*	iShares	iShares Core U.S. Aggregate Bond ETF	IG	-	Bloomberg	$87.9
LQD	iShares	iShares iBoxx $ Investment Grade Corporate Bond ETF	IG	-	iBoxx	$35.8
IUSB*	iShares	iShares Core Total USD Bond Market ETF	IG	-	Bloomberg	$16.0
SCHZ*	Schwab	Schwab U.S. Aggregate Bond ETF	IG	-	Bloomberg	$9.1
USIG	iShares	iShares Broad USD Investment Grade Corporate Bond ETF	IG	-	ICE	$6.6
SPAB*	SPDR	SPDR Portfolio Aggregate Bond ETF	IG	-	Bloomberg	$6.2
GBF*	iShares	iShares Government/Credit Bond ETF	IG	-	Bloomberg	$0.4
IGSB	iShares	iShares 1-5 Year Investment Grade Corporate Bond ETF	IG	1-5 years	ICE	$22.4
IGIB	iShares	iShares 5-10 Year Investment Grade Corporate Bond ETF	IG	5-10 years	ICE	$11.2
SPSB	SPDR	SPDR Portfolio Short Term Corporate Bond ETF	IG	1-3 years	Bloomberg	$7.7
SPIB	SPDR	SPDR Portfolio Intermediate Term Corporate Bond ETF	IG	1-10 years	Bloomberg	$6.7
SLQD	iShares	iShares 0-5 Year Investment Grade Corporate Bond ETF	IG	0-5 years	iBoxx	$2.5
GVI*	iShares	iShares Intermediate Government/Credit Bond ETF	IG	1-10 years	Bloomberg	$2.3
IGLB	iShares	iShares 10+ Year Investment Grade Corporate Bond ETF	IG	10+ years	ICE	$2.0
HYG	iShares	iShares iBoxx $ High Yield Corporate Bond ETF	HY	-	iBoxx	$16.7
JNK	SPDR	SPDR Bloomberg Barclays High Yield Bond ETF	HY	-	Bloomberg	$9.7
USHY	iShares	iShares Broad USD High Yield Corporate Bond ETF	HY	-	ICE	$8.3
SHYG	iShares	iShares 0-5 Year High Yield Corporate Bond ETF	HY	0-5 years	iBoxx	$5.4
SJNK	SPDR	SPDR Bloomberg Barclays Short Term High Yield Bond ETF	HY	0-5 years	Bloomberg	$5.1
HYS	PIMCO	PIMCO 0-5 Year High Yield Corporate Bond ETF	HY	0-5 years	ICE	$1.1

Appendix B – Relationship between holdings and performance: First 20 days

This figure presents the performance for short-term returns relative to the offering price for days 1 through 20, as shown for a sample of days in Panel B of Table 5. Included in the regression as controls are log of bond size, log of bond time to maturity, and fixed effects for rating bucket, ETF, offering year and industry. Standard errors are clustered at the issuer level; the gray lines represent 95% confidence intervals.