Passive investors, active moves: ETFs IPO participation in China

Haiqiang Chen, Xiaoqun Liu, Bo Ni, and Zhuo Zhong[1]

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Abstract

We examine a unique phenomenon among exchange-traded funds (ETFs) in the Chinese stock market, finding that ETFs pervasively participate in initial public offerings (IPOs) to profit from underpricing. The ETF IPO participation passes primary market benefits (about 4.68% per annum) to investors, providing benefits from hard-to-reach investment opportunities. These active moves showing ETFs are not entirely passive highlight the gains of the active management. However, we observe that this activity leads to increased non-fundamental volatility and short-term return reversals, as well as decreased investment-q sensitivity among ETF member stocks, presenting a negative externality. Using a policy shock as the quasi-natural experiment, we establish the causality of these effects, underscoring the dual nature of ETFs active management.

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1. Introduction

The rise of exchange-traded funds (ETFs) has revolutionized financial markets, yet they are often perceived as largely passive due to their index-tracking mandate. Interestingly, many ETFs allocate a portion of their assets outside the underlying index, claiming this discretionary approach benefits investors.[2] Such flexibility enables ETFs to strategically manage their holdings, raising questions about whether this discretion truly serves investors' interests. More importantly, it prompts consideration of the broader market consequences of these actions, even if they serve ETF investors' interests. Understanding both the economic benefits and potential ripple effects is important for practitioners and regulators seeking to comprehend the evolving role of ETFs and their impact on financial markets. To investigate the implications of ETFs' discretionary allocation, we focus on a unique case in China, where ETFs participate directly in initial public offerings (IPOs). This pronounced form of active management allows us to assess how ETFs' discretionary allocation benefit investors, providing insights into the broader implications of their strategic managment of holdings.

We first show that ETFs are actively involved in IPOs within the Chinese A-share market. About 90% of all equity ETFs have participated in IPOs from January 2016 to December 2021. ETFs pass their gains from investing in newly listed companies during IPOs to investors by outperforming their underlying indices. The excess return of an ETF over its underlying index is positively associated with the ETF's gains from IPO participation. The average monthly return from ETF IPO participation is about 39 basis points (about 4.68% per annum, which is over three

[2]From iShares Russell 1000 ETF prospectus: *"The Fund seeks to track the investment results of the Russell 1000® Index (the 'Underlying Index') … The Fund generally will invest at least 80% of its assets in the component securities of its Underlying Index and may invest up to 20% of its assets in certain futures, options and swap contracts, cash and cash equivalents, including shares of money market funds … as well as in securities not included in the Underlying Index, but … will help the Fund track the Underlying Index..."*

times of the risk free rate in the same period), comparable to the average monthly ETF excess return of 31 basis points. However, this IPO-associated excess return translates into a significant positive tracking error for the ETF. Despite this, investors do not appear to object to the substantial tracking error. ETF flow is positively correlated with returns from the ETF's IPO participation. We also find that ETF creations are positively associated with the ETF's IPO returns, consistent with increased flow leading to the creation of more ETF units. In our cross-sectional study, we observe that the effect of the ETF's IPO return on excess return, tracking error, flow, and creations is more pronounced among industry ETFs compared to market-index ETFs.

We use the launch of the Science and Technology Innovation Board (STAR) on the Shanghai Stock Exchange to test the causality of our results, specifically the impact of ETF IPO participation on ETF excess returns, tracking error, flow, and creations. The launch of the STAR significantly increased the number of IPOs on the Shanghai Stock Exchange compared to its main competitor, the Shenzhen Stock Exchange. This exogenous increase in IPO activity provided higher returns from IPO participation for the 21 ETFs tracking indices with only stocks listed on the Shanghai Stock Exchange (treatment group ETFs) but not for the other 25 ETFs tracking indices with constituents only listed on the Shenzhen Stock Exchange (control group ETFs). This distinction arises from the requirement that investors must hold stocks listed on a specific exchange to participate in its IPOs. We leverage this quasi-natural experiment by using the interaction of a dummy variable for the launch event and a dummy variable for the treatment group as an instrumental variable. Our instrumental variable two-stage least squares (IV-2SLS) regression analysis confirms the causality of our findings, further supporting our main results.

Our results indicate that ETF IPO participation is an equilibrium outcome,

evidenced by the pervasive participation decisions from ETF managers and the increased investor flow following those decisions. The innovation would be welfare-improving if it does not incur a negative externality. What could be the negative consequence of this innovation? Motivated by past studies on the impact of ETF creations and redemptions on volatility in the US market (see Ben-David, Franzoni, and Moussawi, 2018; Brown, Davies, and Ringgenberg, 2021), we investigate if ETF IPO participation leads to an increase in stock-level volatility in China.

We find that ETF IPO participation leads to higher contemporaneous stock-level volatility. This increase in volatility is not driven by fundamental factors but by a temporary surge in flow-led ETF creations resulting from ETF IPO participation. Consequently, the heightened volatility is relatively short-lived, reverting to normal levels the following month. This change in volatility is not trivial. It is about eight times the average monthly change in volatility. In other words, ETF IPO participation results in increased ETF creations, which affect the trading of ETFs' constituent stocks, adding substantial non-fundamental movements to stock returns.

We also find that trading related to ETF creations leads to short-term return reversal among ETF constituent stocks. This is consistent with the implication of the stock price being inelastic or lacking liquidity. ETF creations trigger a temporary increase in buying pressure, pushing up prices and resulting in temporary positive stock returns. Subsequently, as price pressure dissipates, stock prices fall, and returns turn negative. The magnitude of the short-term price run-up is at the level close to the average monthly return of the stock.

The increase in non-fundamental movements in stock returns is more than just a quantitative impact resulting from ETF IPO participation; it also qualitatively impairs company managers' ability to use stock prices to guide corporate investment decisions.

We find that ETF creations reduce investment-q sensitivity, even after accounting for the positive influence of ETF ownership.

While index mutual funds can also participate in IPOs and pass returns from their IPO participation to investors, investors do not seem to respond to index mutual funds' IPO returns. On one hand, we find that index funds' IPO participation is associated with their excess returns and tracking error. On the other hand, index funds' IPO-associated returns do not attract fund flow, unlike ETFs.

In sum, we find that the active IPO participation strategy adopted by Chinese ETFs has a dual impact. On one hand, it benefits retail investors, allowing them to share IPO returns. On the other hand, it creates non-trivial externalities in the form of increased non-fundamental volatility and short-term return reversals, but decreased investment-q sensitivity among ETFs' constituent stocks.

We contribute to the literature on financial innovation by analyzing the benefits and costs that ETFs bring to the market. Theoretical work by Gorton and Pennacchi (1993) shows that index-linked securities such as ETFs improve the welfare of uninformed investors by reducing their trading losses. Huang, O' Hara, and Zhong (2021) demonstrate that ETFs facilitate informed trading by allowing investors to hedge unwanted risks. Glosten, Nallareddy, and Zou (2021) find that ETFs help incorporate systematic earnings information in a timely manner. However, past studies examining the impact of ETFs on market quality reveal that they increase non-fundamental volatility (Ben-David, Franzoni, and Moussawi, 2018; Brown, Davies, and Ringgenberg, 2021), amplify return comovement (Da and Shive, 2018), and decrease informational efficiency (Israeli, Lee, and Sridharan, 2017; Bhojraj, Mohanram, and Zhang, 2020). Those are costs associated with the ETF innovation.

Past studies also indicate that ETFs are not entirely passive, a less explored aspect of this financial innovation. Cheng, Massa, and Zhang (2019) and Brogaard,

Heath, and Huang (2024) find that ETFs which do not fully replicate their underlying indices actively manage their holdings. Koont, Ma, Pastor, and Zeng (2024) observe that fixed-income ETFs actively manage their creation and redemption baskets. ETFs also time creation/redemptions to avoid taxes (Moussawi, Shen, and Velthuis, 2024). Additionally, Ben-David, Franzoni, Kim, and Moussawi (2023), as well as Huang, Song, and Xiang (2023), show that thematic or smart-beta ETFs are often launched to capture investor attention or time the market, but they tend to underperform after inception. Dannhauser and Dathan (2023) further demonstrate that bond ETFs participate in the primary corporate bond market even when these bonds are not yet included in the ETF's benchmark index. We build on this body of literature by examining ETF activity in the primary equity market in China and investigating its impact on the market.

Our empirical work also contributes to the literature on IPOs in the Chinese stock market (Chan, Wang, and Wei, 2004, Cheung, Ouyang, and Tan, 2009, Tian, 2011, Chen, Wang, Li, Sun, and Tong, 2015, Zhang, Derrien, Wu, and Zeng, 2021, Cong and Howell, 2021, Qian, Ritter, and Shao, 2024).

The reminder of our paper is organized as follows: Section 2 describes the regulatory background of the Chinese stock market and our data. Section 3 shows our main analysis on ETFs IPO participation, where we include the instrumental variable analysis to establish the causality claim. Section 4 discusses and tests the economic implications of ETFs IPO participation. Section 5 compares ETFs with index mutual funds regarding IPO participation. Finally, we conclude in Section 6.

2. Regulatory background and data description

Regulations have significantly impacted IPOs in the Chinese A-share market since its inception in the 1990s. The China Securities Regulatory Commission (CSRC), established in 1992 shortly after the launch of the Shanghai Stock Exchange (SSE) in December 1990 and the Shenzhen Stock Exchange (SZSE) in April 1991, oversees these regulations. In this section, we elaborate on the IPO selling methods and participation processes during our sample period from 2016 to 2021 and provides detailed descriptive information on our data.[3]

2.1. Regulatory and institutional details regarding IPOs in China (2016-2021)

During our sample period (2016-2021), IPOs were conducted either through a hybrid of auction and fixed price offering method or solely through fixed price offerings. There was an implicit uniform price control from 2016 to 2021, except for IPOs on the Science and Technology Innovation Board of the Shanghai Stock Exchange (also known as the STAR) and Growth Enterprise Market of the Shenzhen Stock Exchange (also known as the GEM). The CSRC's "window guidance" recommended a P/E cap of 23 for IPOs. This guidance, although not legally binding, was a policy tool used by the CSRC to direct financial institutions and market participants. The price control resulted in substantial initial IPO returns, averaging 105.35% during our sample period. Figure 1 summarizes the historical price control on IPOs in the Chinese stock market.

[Insert Figure 1 here]

The high initial returns attracted many investors to IPOs. There are two tranches for IPO participation: the online tranche and the offline tranche. The online tranche is available to both institutional and retail investors, while the offline tranche is limited

[3]Qian, Ritter, and Shao (2024) provide a detailed description on the IPO regulations and its history in

to institutional investors. Typically, 50% or more of IPO shares are allocated to the online tranche (see Qian, Ritter, and Shao, 2024). Investors can participate in only one tranche. The offering price is determined in the offline tranche and then used as the offering price for the online tranche. In the online tranche, investors are restricted to acquiring up to 0.1% of the shares available, while there is no such constraint in the offline tranche.

Additionally, investors must meet specific holding requirements to participate in IPOs. On the Shanghai Stock Exchange or Shenzhen Stock Exchange, the quota for online tranch IPO subscriptions is calculated based on the average daily holdings of non-restricted A-shares on the respective exchange over the previous 20 trading days. Specifically, every 10,000 Chinese Yuan of market value corresponds to 1,000 IPO shares on the Shanghai Stock Exchange, and every 5,000 Chinese Yuan of market value corresponds to 500 IPO shares on the Shenzhen Stock Exchange.[4]

2.2. Data description and sample statistics

Our sample consists of 420 equity ETFs that have directly invested in IPOs in the Chinese A-share market from January 2016 to December 2021. These ETFs represent 91% of all equity ETFs issued during this period.[5] Figure 2 illustrates the significant growth trends in equity ETFs in China.

Table 1, Panel A, provides the monthly summary statistics on our ETF sample. The average ETF size is 1.80 billion Chinese Yuan (approximately 257 million USD). We calculate ETF size as the product of outstanding shares and the net asset value at the end of each month. The average monthly tracking error is 5.244 basis points,

[4]Non-restricted A-shares refer to publicly traded shares of Chinese companies that are available for both domestic and foreign investors. These shares are not subject to any restrictions on ownership or transfer, as opposed to restricted A-shares, which are limited to domestic investors and subject to certain ownership restrictions.

[5]There are 461 equity ETFs during our sample period, and only 41 ETFs do not participate in any

defined as the standard deviation of the daily return difference between an ETF and its underlying index. On average, our sample ETFs generate a monthly excess return of about 0.312%, which is the difference in monthly returns between an ETF and its underlying index.

[Insert Table 1 here]

[Insert Figure 2 here]

On average, our sample ETFs hold about 26 newly listed stocks each month. To compute the return from an ETF's IPO participation, we first estimate the IPO return for all 3,028 newly listed stocks during the sample period. The stock-level IPO return *IPO_Ret* is calculated as follows: (1) For shares not subject to a lockup, we multiply the number of shares by the difference between the aftermarket price (the average traded price on the first trading day since the IPO) and offering price, i.e., $\text{IPO\_Ret} = (\ln \text{Avg.price@IPO.open.date} - \ln \text{Offer.price}) \times \text{Num.shares}$. (2) For shares subject to a lockup, since the ETF cannot sell the newly listed shares until the lockup period expires (usually six months), we consider the number of shares multiplied by the difference between the end-of-month price and offer price as the total IPO return for the first six months, i.e., $\text{IPO\_Ret} = (\ln \text{Price@End.of.month} - \ln \text{Offer.price}) \times \text{Num.shares}$. Then, for each ETF, we define the monthly return from its IPO participation (*ETF_IPO_Ret*) as $\text{ETF\_IPO\_Ret}_{i,t} = \sum_{j=1}^{J} \frac{\text{IPO\_Ret}_{j,t}}{\text{Size}_{i,t-1}}$, where *J* is the total number of IPOs held by ETF *i* by the end of month *t*. The average monthly *ETF_IPO_Ret* is 0.388%, comparable to the average monthly ETF excess return of 0.312%. The monthly average fund flow of our ETFs is 0.822%, calculated as the montly change in a fund's total net asset value (TNA) net of the fund's the monthly return (following Dannhauser and Pontiff, 2024). The average monthly ETF creation/redemption activity is 0.026%, estimated by

averaging daily changes in ETF shares outstanding over a month.

We find that larger ETFs are more likely to participate in IPOs. Panel B of Table 1 reports the results of the Probit and Panel OLS models exploring the relationship between ETF size and IPO participation activity. *Dummy(ETF_IPO_Num > 0)* and *ETF_IPO_Num* are dependent variables capturing an ETF' s IPO participation. For Panel OLS regressions, we control for various fixed effects. Standard errors are clustered by ETFs. We find that ETF size (*ln(Size)*) has a statistically significant and positive impact on IPO participation in both Probit and Panel regressions. According to the Probit regression, a one percent increase in size is associated with about a half percent increase in the likelihood of an ETF participating in IPOs.

3. ETF IPO participation

IPOs in the Chinese A-share market are known for significant underpricing, with Qian, Ritter, and Shao (2024) reporting an average first-day IPO return of 172% between 1990 and 2021. This underpricing explains why Chinese ETFs can generate positive returns from their IPO participation, averaging a 0.393% monthly return (or 4.68% per annum). This raises an important question: Are these IPO returns effectively transmitted to ETF investors, primarily retail investors with limited access to the IPO market? If so, then the ability of ETFs to capitalize on IPO returns represents a significant innovation in the ETF market– – – facilitating retail investors' access to otherwise hard-to-reach investment opportunities. On the other hand, what tradeoffs do ETF managers face when adopting this innovative strategy? In this section, we address these questions by investigating the relationship between the return from an ETF' s IPO participation and its excess return, tracking error, and fund flow.

3.1. IPO participation, ETF excess returns, and ETF tracking error

We begin our empirical analysis by examining the relationship between returns from ETFs' IPO participation and ETF excess returns. Since positive ETF excess returns indicate that ETF investors benefit from their investments, analyzing this relationship will help us assess whether IPO returns are effectively transmitted to ETF investors.

To examine the relationship, we use a Panel OLS model as follows,

$$\text{ETF\_Excess\_Ret}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}, \quad (1)$$

where *ETF_Excess_Ret* represents the difference between returns from the ETF and the index it follows.*ETF_IPO_Ret* captures the return from the ETF's IPO participation. We include the natural logarithm ETF size, *ETF_IPO_Num*, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index as the control variable. We have also considered regression models with and without ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. Results are reported in Table 2.

[Insert Table 2 here]

We find that *ETF_IPO_Ret* has a statistically significant positive impact on *ETF_Excess_Ret*, suggesting that the ETF' s return from its IPO participation is positively associated with the ETF' s excess return. The effect is also economically significant. The regression coefficient, which ranges from 0.332 to 0.473, when multiplied by the average return from ETF IPO participation (approximately 0.388%), accounts for almost half of the average ETF excess return (i.e., the mean of *ETF_Excess_Ret* is about 0.312%). The Panel OLS result remains consistent even when we consider various fixed effects.

Based on Table 2, we observe that ETFs pass their gains from IPO participation to investors through excess returns. However, these increasing excess returns may also

signify that ETFs could experience larger tracking error. To formally test this conjecture, we run the following Panel OLS model:

$$\text{Track\_Error}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}, \quad (2)$$

where *Tracking_Error* is the monthly tracking error. As in Eq.(1), we include the natural logarithm ETF size, *ETF_IPO_Num*, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index as the control variable, and also considered regression models with and without ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. Results are reported in Table 3.

[Insert Table 3 here]

Consistent with our conjecture, *ETF_IPO_Ret* has a statistically significant positive impact on *Tracking_Error*. The regression coefficient (ranging from 0.019 to 0.031) times the average return from ETF' s IPO participation (roughly 0.388%) translates to about one basis point. This amount is about one-fifth of the average ETF tracking error (the mean of *Tracking_Error* is about five basis points). The Panel OLS result remains consistent when we consider various fixed effects.

3.2. IPO participation and ETF flow

The active IPO participation strategy presents a double-edged sword for ETF managers. While IPO returns can yield significant excess performance relative to the index that an ETF tracks, they can also increase tracking error. The increase in tracking error may deter investors, who prioritize index tracking, potentially leading to a reduction in fund flow. Despite this risk, during our sample period, we observed that most ETFs (420 out of 461) participated in IPOs, suggesting that ETF managers generally believe that the benefit– – – enhanced performance– – – outweighs the cost associated with increased tracking error. This indicates a calculated acceptance of the

tradeoffs involved in deciding to adopt this innovative strategy, signaling that ETF managers are not overly concerned about losing investors who prefer strict index tracking. To test if that is the case, we investigate the relationship between ETF fund flow and the return from ETF IPO participation.

Our Panel OLS model is as follows,

$$\text{Flow}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}, \quad (3)$$

where *Flow* is fund flow for an ETF defined as the change of a fund' s total net asset value (TNA) netting out the return of the fund, i. e., $\text{Flow}_{i,t} = \frac{\text{TNA}_{i,t} - \text{TNA}_{i,t-1} \times (1 + \text{Ret}_{i,t})}{\text{TNA}_{i,t-1}}$. Control variables are the same as in Eq.(1), and we also considered regression models with and without ETF and time fixed effects. Since ETF flow can be persistent, we include lagged *Flow* as an additional control variable. Standard errors are clustered by ETFs and reported in parentheses. Results are reported in Table 4.

[Insert Table 4 here]

We find that ETF IPO participation has a positive and statistically significant effect on ETF flow, as indicated by the significant coefficients of *ETF_IPO_Ret*. The magnitude of the effect is economically significant. It is roughly 3.7× 0.388%=1.44%, which is about two times the monthly average ETF flow. This suggests that while the return from an ETF's IPO participation may alienate some investors who prioritize index tracking, it also attracts other types of investors. Consequently, the overall effect of investors' responses to ETFs profiting from IPO participation is an increase in their investment, manifesting in a significant positive impact of *ETF_IPO_Ret* on *Flow*.

3.3. IPO participation and ETF creations/redemptions

It is worth noting that, unlike flow to traditional mutual funds involving only cash

exchanges, ETF flow triggers in- kind creations or redemptions with authorized participants (APs). The creation (redemption) mechanism, known as the primary ETF market, involves the AP delivering a basket of the underlying constituents to the ETF sponsor in exchange for an ETF unit. For example, when investors chasing for an ETF drive the price above its net asset value, an AP may arbitrage by buying the underlying basket and delivering the basket to the ETF sponsor in exchange for a creation unit of ETF shares. The creation results in an inflow for the ETF. We show the results of regressing ETFs' *Flow* on *Creations/redemptions* in Panel A of Table 5.

$$\text{Flow}_{i,t} = \beta_1 \text{Creations/redemptions}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}, \quad (4)$$

where *Creations/redemptions* are measured as the changes in the shares outstanding of the ETF. Columns (1) and (2) report the regression results at the fund-month and fund-day level, respectively. Control variables are the same as in Eq.(1) but measured at monthly and daily intervals, respectively. ETF and time fixed effects are applied. We find that *Flow* and *Creations/redemptions* are positively correlated. The correlation is statistically significant at 1%. The adjusted *R-squared* is about one indicating an almost perfect linear relationship between *Flow* and *Creations/redemptions*.

Given the positive correlation between *Flow* and *Creations/redemptions*, we hypothesize that ETF IPO participation should trigger ETF creations/redemptions. We examine our hypothesis with the following regression,

$$\text{Creations/redemptions}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}, \quad (5)$$

and we find *ETF_IPO_Ret* has a significant impact on ETF creations/redemptions. The coefficient ranging from 0.135 to 0.185 is statistically significant. The impact is also economically significant, as the magnitude of the effect (which is in between $0.135 \times 0.388\% = 0.05\%$ and $0.185 \times 0.388\% = 0.071\%$) is larger than the average ETF creations/redemptions of 0.026%.

The significant impact of *ETF_IPO_Ret* on *Creations/redemptions* suggests that ETF IPO participation could spill over to trading of ETFs' constituent stocks, creating an externality in the trading environment of underlying stocks. We will further investigate this externality and evaluate its implications in a later section, following additional tests to demonstrate the robustness of our main findings.

[Insert Table 5 here]

3.4. Cross-sectional results on ETF excess returns, tracking error, and flow

Although participating in IPOs may deter index trackers for ETFs—due to the deviations from the index—the allure of potential high returns from such activities tends to attract a different type of investor, one who prioritize ETF excess return over tracking error. Investors in industry ETFs, who often speculate on the prospect of an industry, are more likely to prioritize performance over tracking error. In contrast, the investor base for market-index ETFs is more diverse and likely to include a significant portion of index-trackers. So, in comparison, the impact of IPO participation should be relatively subdued in market-index ETFs, and more pronounced in industry ETFs.

To examine the above-mentioned hypothesis, we sort our ETF sample into industry and market-index ETFs, then re-run regressions (Eqs. 1-3) for each category, respectively. We also include a category dummy variable (*Dum_Industry ETF*) interacting with the key independent variable *ETF_IPO_Ret*. The interaction term allows us to see if the relationship between the excess return (or tracking error, or flow, or creations/redemptions) and *ETF_IPO_Ret* is stronger for industry ETFs compared to market-index ETFs.

[Insert Table 6 here]

We report our regression results in Table 6. We find that the cross-sectional

results largely confirm our hypotheses. When examining *ETF_IPO_Ret*'s influence, industry ETFs display a significant and more substantial positive relationship with *ETF_Excess_Ret* (0.625) compared to market-index ETFs (0.276). The difference between these two, as indicated by *ETF_Excess_Ret× Dum_Industry ETF*, remains statistically significant at 1%. This suggests that IPO participation in industry ETFs has a stronger association with excess returns than market-index ETFs. Similarly, for *Tracking_Error*, industry ETFs also show a higher positive association (0.049) than market ETFs (0.012), with the differential effect being statistically significant at 1%.

ETF_IPO_Ret has a very pronounced effect on *Flow* and *Creations/redemptions* for industry ETFs (6.605 and 0.318) compared to a much milder effect for market ETFs (2.524, and 0.126). The interaction term further substantiates the pronounced differential effect on industry over market-index ETFs.

Cross-sectional analysis supports our hypotheses that returns from ETF IPO participation have more pronounced impact on industry ETF in terms of the excess return, tracking error, flow, and creations/redemptions.

3.5. Test the causal relationship with the launch of the STAR market

We have demonstrated a positive association between the return of ETF IPO participation and excess returns, tracking error, fund flow, and creations/redemptions. It is important to note that these positive relationships do not necessarily imply causation, as an omitted variable may drive the relationship. For instance, certain sectors trending upwards may result in more IPOs in those sectors, leading to superior ETF performance and increased fund flow. To address potential endogeneity issues, we leverage the launch of the Science and Technology Innovation Board of the Shanghai Stock Exchange (also known as the STAR Market) as a pseudo-natural experiment to test for causal relationships.

The launch of the STAR market in July 2019 boosted the number of IPOs on the Shanghai Stock Exchange. In contrast, the Shenzhen Stock Exchange, which is the second-largest stock market in China, does not get more IPOs in the same period. Compared to ETFs tracking indices on the Shenzhen Stock Exchange, ETFs tracking indices on the Shanghai Stock Exchange have more IPO participation as more IPOs become available following the launch of the STAR market. Due to this institutional feature, we can create an instrumental variable (an IV) to identify the exogenous increase of IPO participation for ETFs tracking indices from the Shanghai Stock Exchange. Then, utilizing returns from this exogenous IPO participation to identify causal relationships between the return of ETF IPO participation and excess returns, tracking error, fund flow, and creations/redemptions.

Specifically, we estimate the IV-2SLS model on a subset of 46 ETFs whose holdings are purely from either Shanghai or Shenzhen Stock Exchange from January 2016 to July 2020.[6] The regression model consists of two equations, as follows,

$\text{ETF\_IPO\_Ret}_{i,t} = \gamma_1 \text{Post}_t \times \text{Treat}_i + \text{Controls} + \text{Fixed Effects} + \eta_{i,t},$	(6a)
$\text{ETF\_Excess\_Ret}_{i,t}$ or $\text{Tracking\_Error}_{i,t}$ or $\text{Flow}_{i,t}$ or $\text{Creations/redemptions}_{i,t}$ $= \beta_1 \widehat{\text{ETF\_IPO\_Ret}}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$	(6b)

Post is a time dummy variable, which takes one after July 2019, and zero otherwise. *Treat* is an ETF dummy variable, one for ETFs that purely hold stocks from the Shanghai Stock Exchange, and zero for ETFs that purely hold stocks from the Shenzhen Stock Exchange. Eq.(6a) is the first stage regression, where we identify the effect of the exogenous increase in IPO participation due to the STAR market inception on *ETF_IPO_Ret*. Eq.(6b) is the second stage regression, where we examine the relationship between the fitted value $\widehat{ETF\_IPO\_Ret}$ and *ETF_Excess_Ret*,

[6] We end our IV-2SLS sample period on July 2020 because the Shenzhen Stock Exchange adopts a

Tracking_Error, *Flow*, and *Creations/redemptions*. For control variables, we follow Eq.(1) and include the natural logarithm ETF size, *ETF_IPO_Num*, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index, and also ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. Our IV-2SLS results are reported in Table 7.

[Insert Table 7 here]

Our IV-2SLS regression results show that returns from IPO participation, *ETF_IPO_Ret*, indeed causes the extra performance compared to the underlying index, *ETF_Excess_Ret*, and the positive tracking error. *ETF_IPO_Ret* also causes positive flow and ETF creations/redemptions. Estimation results from the first stage regression and *F-Test* indicate that the *Post× Treat* is a valid instrumental variable.

It is worth pointing out that our IV-2SLS utilizing the launch of the STAR market serves more than a causality test on our previous Panel regression results. The IV-2SLS results also provide direct evidence demonstrating how ETFs actively take advantage on IPO underpricing in China. Relative to ETFs tracking indices on the Shenzhen Stock exchange, ETFs tracking indices on the Shanghai Stock Exchange are able to capture more profits from IPOs because: 1). the STAR market inception boosts IPOs; and 2). the Shanghai Stock Exchange requires IPO participants to hold shares of stocks listed on it. The increase in *ETF_IPO_Ret* enables ETFs tracking indices on the Shanghai Stock Exchange to capture more investors (as indicated by the positive impact of *ETF_IPO_Ret* on *Flow*).

4. The externality of ETF IPO participation

In the previous section, we have shown that ETFs' active IPO participation strategy

benefits their investors. ETFs' IPO participation enables investors to obtain returns from primary market investment which might otherwise be difficult to get. However, as ETFs' IPO participation increases, so do tracking error and ETF creations/redemptions. Studies on the US ETF market have argued that ETF creations/redemptions can lead to volatility that are not driven by fundamental factors (see Ben-David, Franzoni, and Moussawi, 2018, and Brown, Davies, and Ringgenberg, 2021). This leads us to hypothesize that IPO participation may lead to an increase in non-fundamental volatility of the ETF-constituent stocks. Since the constituent stocks cannot influence the decision of ETF IPO participation, any increase in non-fundamental volatility is an externality to these stocks.

4.1. Short-term increase in member stocks' non-fundametal volatility

To test our hypothesis, we apply a similar IV-2SLS regression around the launch of the STAR market (as in Section 3.5) to the constituent stocks of our sample ETFs. Specifically, our regression model is as follows,

$$\text{ETF\_Performance}_{s,t} = \gamma_1 \text{Post}_t \times \text{Treat}_s + \text{Controls} + \text{Fixed Effects} + \eta_{s,t}, \tag{7a}$$

$$\Delta\text{Volatility}_{s,t} = \beta_1 \widehat{\text{ETF\_Performance}}_{s,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{s,t}. \tag{7b}$$

where *ETF_Performance* is the stock-level measurement of *Excess_Ret*, *Tracking_Error*, and *Creations/redemptions*. Specifically, for each stock, we take the weighted sum of ETF performance measure (i. e., the excess return, tracking error, flow, and creations/redemptions) for all ETFs that the stock *s* belongs to. The weight is each ETF's holding shares of the stock divided by total shares held by all ETFs. We do not include ETF flow, as it is positively correlated with ETF creations/redemptions, which more directly and precisely capture the ETF's impact on the trading of its constituent stocks. *Treat* is the stock dummy variable indicating if the stock is held by

ETFs in the treatment group in regression Eq.(6a), i.e., ETFs holding only stocks from the Shanghai Stock Exchange. *Post* is a time dummy variable, which takes one after July 2019, and zero otherwise.

Eq.(7a) tests if the launch of the STAR market impacts the stock-level ETF performance measure. Then in Eq.(7b), we regress the growth of monthly volatility for all ETF member stocks to the fitted value $\widehat{ETF\_Performance}$. Monthly volatility is 100 times the annualized standard deviation of the daily stock return in a month. We use $\Delta Volatility$ to capture the changes in month-to-month volatility. We include the commonly used characteristics variable for the stock level control variable, such as the market capitalization, leverage ratio, ROE, institution shares, PE ratio, turnover, and the natural logarithm of the trading volume. We have also considered stock and time fixed effects. Standard errors are clustered by stocks and reported in parentheses. We report the results in Table 8.

[Insert Table 8 here]

We find that the fitted value $\widehat{ETF\_Performance}$ leads to a positive increase in volatility for the ETF' s constituent stock. The effect is statistically significant at 1%. In terms of the economic magnitude, the effect is roughly $0.613 \times \underbrace{0.312\%}_{\text{Avg.ETF\_Excess\_Ret}} = 0.191\%$, which is about eight times the average monthly volatility change $\Delta Volatility$ (i.e., about 0.020%).

Our findings in Table 8 are consistent with our hypothesis that ETF IPO participation leads to non-fundamental volatility impounded into the constituent stocks' volatility. Furthermore, if the change in volatility is not driven by fundamental factors, it should be relatively short-lived and the temporary change should be reverted. So, we examine the change of stock volatility in the subsequent *t+1* month, using the same regression specification as in Eq.(7a) and (7b), except that $\Delta Volatility$ is

measured at *t+1*. Results are reported in Table 9.

[Insert Table 9 here]

Table 9 confirms our predictions showing that the fitted value $\widehat{ETF\_Performance}$ has a negative impact on the subsequent change of stock volatility. The effect is statistically significant at 1%.

Our findings from Tables 8 and 9 provide evidence supporting our hypothesis that ETF IPO participation leads to a temporary increase in stock volatility. This is driven by non-fundamental factors such as ETF creations/redemptions (column [6] in Tables 8 and 9). Trading related to ETF creations/redemptions adds in non-fundamental movement to stock returns.

4.2. Return reversal among member stocks

Another hypothesis related to non-fundamental movements in stock returns involves the directional impact of IPO participation triggered by ETF creations/redemptions. If one considers stock price to be inelastic, the price pressure from trading related to ETF creations/redemptions leads to directional predictions on stock returns. Specifically, positive ETF creations/redemptions trigger a temporary surge in buying pressure, which would push up prices and result in temporary positive stock returns. Subsequently, as price pressure dissipates, stock prices fall, and returns turn negative.

We test the hypothesis that price pressure driven by ETF IPO participation with the following IV-2SLS regression:

$\text{ETF\_Performance}_{s,t} = \gamma_1 \text{Post}_t \times \text{Treat}_s + \text{Controls} + \text{Fixed Effects} + \eta_{s,t},$	(8a)
$\text{Return}_{s,t} = \beta_1 \widehat{\text{ETF\_Performance}}_{s,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{s,t}.$	(8b)

where *Return* is monthly stock returns. We consider both the market-adjusted (by

subtracting the market return) and risk-adjusted (by Fama-French three/five and Fama-French-Carhart four factors adjustment) stock returns. Control variables are similar to Eqs.(7a) and (7b). And stock and time fixed effects are considered. Standard errors are clustered by stocks and reported in parentheses. We report the regression results in Table 10.

[Insert Table 10 here]

We see from Panels A to C in Table 10 that the ETF's constituent stock exhibits a short-term reversal in its monthly returns. Specifically, the fitted value of $\widehat{ETF\_Performance}$, i. e., $\widehat{ETF\_Excess\_Ret}$, $\widehat{Tracking\_Error}$, and $\widehat{Creations/redemptions}$, leads to a contemporaneous positive return, which turns into negative in the following month. The effects are statistically significant. In terms of the economic magnitude of the reversal, the subsequent reversal in returns almost completely erase positive returns accumulated in the previous month. For example, $\widehat{ETF\_Excess\_Ret}$ leads to roughly a Fama-French five factor adjusted return of $1.942 \times \underbrace{0.312\%}_{\text{Avg.ETF\_Excess\_Ret}} = 0.606\%$ in the current month, but a negative return of about $-1.070 \times \underbrace{0.312\%}_{\text{Avg.ETF\_Excess\_Ret}} = -0.334\%$ in the following month. In terms of the magnitude, the 0.606% positive increase is almost the magnitude of the monthly average, i.e., -0.478%, and the -0.334% decrease is more than one half of it. Tables 9 to 11 confirm our hypothesis that ETF IPO participation could lead to stock return movement that is driven by non-fundamental factors.

4.3. Noisy stock prices and corporate investment

Research has shown that stock prices carry valuable information that can influence a company' s real investment decisions. Bond, Edmans, and Goldstein (2012)

provide a comprehensive review of the literature on how information from financial markets impacts real investment. The concept of corporate managers using stock prices to inform investment decisions extends beyond the US market. For instance, Goldstein, Liu, and Yang (2023) conduct a survey of companies listed in China and discover that over 90% of these firms reported leveraging stock market insights to guide their real investment choices. Consequently, if stock prices are affected by non-fundamental shocks, companies' investment decisions can be negatively impacted—a finding supported by prior research (Dessaint, Foucault, Fré sard, and Matray, 2019). Building on this body of work, we hypothesize that the significant increase in non-fundamental volatility and short-term return reversals caused by ETF IPO participation reduces the sensitivity of real investment to stock prices.

Specifically, we run the following IV-2SLS regressions on the constituent stocks of our treatment and control ETFs (as in Sections 4.1 and 4.2):

$$\text{Creation\_Redemption}_{s,q-1} = \gamma_1 \text{Post}_{q-1} \times \text{Treat}_s + \gamma_2 \text{Post}_{q-1} \times \text{Treat}_s \times \text{Q}_{s,q-1} + \text{Controls} + \text{Fixed Effects} + \eta_{s,q-1}, \tag{9a}$$

$$\text{Creation\_Redemption}_{s,q-1} \times \text{Q}_{s,q-1} = \theta_1 \text{Post}_{q-1} \times \text{Treat}_s + \theta_2 \text{Post}_{q-1} \times \text{Treat}_s \times \text{Q}_{s,q-1} + \text{Controls} + \text{Fixed Effects} + \eta_{s,q-1}, \tag{9b}$$

$$\text{Investment}_{s,q} = \beta_1 \widehat{\text{Creation\_Redemption}}_{s,q-1} + \beta_2 \widehat{\text{Creation\_Redemption}_{s,q-1} \times \text{Q}_{s,q-1}} + \beta_3 \text{Q}_{s,q-1} + \text{Controls} + \text{Fixed Effects} + \eta_{s,q}. \tag{9c}$$

Creation_Redemption is the weighted sum of quarterly creation and redemption activities of the ETF holding the stock *s*. *Investment* is the sum of a company's capital expenditures and R&D expenses (scaled by total assets) in quarter *q*. *Q* is the company's quarterly Tobin's *q*, defined as the market value of equity plus the book value of asset minus the book value of equity, scaled by the book value of assets at the end of the previous quarter. *Post* is a time dummy variable, which takes one after 2019Q2, and zero otherwise. *Treat* is an ETF dummy variable, which is one for the constituent stock from ETFs only hold stocks on the Shanghai Stock Exchange, and zero for constituent stocks from ETFs purely hold stocks on the Shenzhen Stock

Exchange.

Antoniou, Li, Liu, Subrahmanyam, and Sun (2023) find that ETF ownership enhances investment-q sensitivity. To isolate the effect of ETF ownership and its creations/redemptions on investment-q sensitivity, we include ETF ownership and its interaction with Tobin's q in our analysis. Additionally, we incorporate cash flow and its interaction with ETF ownership, as well as firm size and its interaction with Tobin's q. We also control for residual institutional ownership (orthogonalized to ETF ownership) and its interaction with Tobin's q, annualized stock returns over the next four quarters, leverage, cash holdings, return on assets, sales growth rate, and the inverse of total assets. Our model also accounts for stock and time (year-quarter) fixed effects. Standard errors are clustered by stock. We report the regression results in Table 11.

[Insert Table 11 here]

Columns 1 and 2 indicate that treatment stocks experience a significant increase in ETF creations/redemptions, as well as in the interaction between creations/redemptions and Tobin's q. This finding aligns with the results shown in Table 9. In the second stage, we observe that the coefficient of the fitted value $\widehat{Creation\_Redemption} \times Q$ has a significantly negative effect on the company's investment indicating the impact of ETF IPO participation on creations/redemptions decrease investment-$q$sensitivity. Although ETF ownership demonstrates a significantly positive impact on investment-q sensitivity (Coef. $Q \times ETF\_Ownership$ = 0.177***), consistent with Antoniou et al. (2023), the impact of ETF IPO participation continues to impair investment-q sensitivity (Coef. = -0.902**), even when controling for ETF ownership.

The results in Table 11 indicate that the externality from ETF IPO participation

extends beyond a mere quantitative impact on the non-fundamental volatility of member stocks. The increased volatility results in noisier stock prices, which qualitatively impairs company managers' ability to utilize stock prices effectively for guiding corporate investment decisions.

5. Comparing ETFs with index mutual funds

In theory, mutual funds can also provide investors with access to the primary equity market and pass the potential returns from IPOs to investors. However, we hypothesize that, in practice, investors prefer ETFs over mutual funds because of the inherent transparency and ease of trading offered by ETFs. In other words, despite the improved performance, the returns from IPO participation in mutual funds are not associated with future fund flow, which is different from returns from IPO participation in ETFs. We test this hypothesis with passive index mutual funds, as they are more comparable to ETFs than active mutual funds.

Specifically, we construct a similar *ETF_IPO_Ret* measure for passive index mutual funds, referred to as *Fund_IPO_Ret*. We then examine how it is related to *Excess_Ret*, *Tracking_Error*, and *Flow* for index funds. All three fund-level performance measures are constructed in the same manner as those used for ETFs. Following this, we re-run Eqs. (1)-(3) with the index funds sample and report our results in Table 12.

[Insert Table 12 here]

Similar to ETFs, index funds' IPO participation improves their returns in excess of the index benchmark. However, this positive excess return is accompanied by a larger tracking error when funds participate in IPOs. The regression coefficients of *Fund_IPO_Ret* are statistically significant when dependent variables are *Excess_Ret* and

Tracking_Error. These results confirm that index funds can also pass IPO returns to their investors when engaging in the primary market.

What is surprising, however, is that investors appear to be inactive in response to index funds' IPO returns. *Fund_IPO_Ret* does not have a statistically significant association with *Flow*. This finding supports our hypothesis that when it comes to accessing hard-to-reach primary market opportunities, investors primarily use ETFs over mutual funds as their investment vehicle.

6. Conclusion

In summary, our findings demonstrate that Chinese ETFs' active IPO participation strategy offers significant benefits to their investors by providing access to IPO returns that might otherwise be unattainable. This active management by ETFs enhances the potential for profit, making ETFs an attractive option for investors.

However, our analysis also reveals that increased IPO participation by ETFs is associated with a rise in tracking error and ETF flow and creations. These activities contribute to a non-trivial increase in non-fundamental volatility and short-term return reversal in the ETF' s constituent stocks, both are externalities imposed on ETF member stocks. These externalities go beyond a mere quantitative change on stock returns; they qualitatively impair managers' ability to use stock prices effectively for guiding corporate investment decisions.

Our analysis highlights the dual impact of ETFs' active management: while ETF IPO participation can drive investor returns, it also introduces new layers of complexity and volatility to the market. Understanding these dynamics is crucial for investors and policymakers aiming to balance the benefits of innovation with the stability of the financial markets. Future research could further explore the long-term

effects of ETF IPO participation on market behavior and investor welfare, as well as potential regulatory measures to mitigate the associated externality.

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Table 1: Summary statistics for the sample

Panel A of Table 1 provides the summary statistics on the (ETF and month) panel data of our sample. The size of the ETF is calculated as its outstanding shares times the net asset value at the end of each month. The monthly tracking error is the standard deviation of the daily tracking errors in the month, where the daily tracking error is calculated as the difference between daily returns from the ETF and index it follows. The ETF monthly excess return is defined as the difference between monthly returns from the ETF and the index it follows.*ETF_IPO_Num* is the number of newly listed stocks in the ETF' s monthly holdings. The *ETF_IPO_Ret* is calculated with the following two steps: First, compute the stock-level IPO return, *IPO_Ret*, that is calculated as (a) For shares that are not subject to lockup, we consider the number of shares times the difference between the aftermarket price (the average traded price on the first trading date since the IPO) and the offering price as the total IPO return, i.e., IPO_Ret = (ln Avg.price IPO.open.date − ln Offer.Price)× Num.shares; (b). For shares subject to lockup, since the ETF cannot sell the newly listed shares until the lockup period is expired (typically six months), we consider the number of shares times the difference between the end-of-month and the offer price as the total IPO return for the first six months since the IPO, i.e., IPO_Ret = (ln End.of.month Price − ln Offer.price)× Num.shares. Then, for each ETF, we define the monthly return from its IPO participation (*ETF_IPO_Ret*) as $\text{ETF\_IPO\_Ret}_{i,t} = \sum_{j=1}^{J} \frac{\text{IPO\_Ret}_{j,t}}{\text{Size}_{i,t-1}}$, where J is the total number of IPOs the ETF i has subscribed in the IPO by the end of month t.

Panel B of Table 1 reports regression results for Probit and Panel OLS models. The Probit model is as follows,

$$\text{Dummy}(\text{ETF\_IPO\_Num} > 0)_{i,t} = \alpha_1 \ln \text{Size}_{i,t-1} + \text{Fixed Effects} + \epsilon_{i,t};$$

and Panel OLS is as follows,

$$\text{ETF\_IPO\_Num}_{i,t} = \alpha_1 \ln \text{Size}_{i,t-1} + \text{Fixed Effects} + \epsilon_{i,t}.$$

Standard errors are clustered by ETFs and reported in parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

Panel A: Summary statistics

	Mean	**Std**	**5%**	**25%**	**50%**	**75%**	**95%**
Size (billion RMB)	1.797	4.058	0.022	0.027	0.306	1.282	9.951
100× Tracking_Error (%)	5.244	5.708	0.873	1.994	3.551	6.067	15.520
ETF_Excess_Ret (%)	0.312	0.637	-0.266	-0.020	0.146	0.462	1.500
ETF_IPO_Num	26.278	28.348	0	4	15	43	85
ETF_IPO_Ret (%)	0.388	0.648	0	0.019	0.143	0.467	1.582
Flow(%)	0.822	17.945	-21.789	-5.224	-0.453	3.239	26.742
Creation_Redemption(%)	0.026	0.829	-1.078	-0.244	-0.015	0.177	1.283

Panel B: ETF size and IPO participation

Regression model:	***Probit model***	***Panel OLS***			
	[1]	[2]	[3]	[4]	[5]
Lag ln(Size)	**0.382*** **	**6.790*** **	**5.174*** **	**10.634*** **	**4.570*** **
	(0.015)	**(0.624)**	**(0.463)**	**(0.817)**	**(0.646)**
Fixed.Effects			Time	ETF	ETF, Time
Adj.R-squared	0.172	0.183	0.623	0.155	0.684
Num.Obs	9,774	9,774			

Table 2: The impact of IPO participation on excess returns

Table 2 reports the Panel OLS results analyzing the impact of ETFs' IPO participation on their excess returns, i.e.,

$$\text{ETF\_Excess\_Ret}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

The dependent variable *ETF_Excess_Ret* represents the monthly return differential between the ETF and its benchmark index. *ETF_IPO_Ret* quantifies returns specifically from IPO participations. For each ETF, we define the monthly return from its IPO participation as $\text{ETF\_IPO\_Ret}_{i,t} = \sum_{j=1}^{J} \frac{\text{IPO\_Ret}_{j,t}}{\text{Size}_{i,t-1}}$, where *J* is the total number of IPOs the ETF *i* has subscribed by the end of month *t*. *IPO_Ret* is the IPO return. *Size* is the market capitalization of the ETF calculated as its outstanding shares times the net asset value at the end of each month. Controls include the natural logarithm ETF size, the number of IPOs by the ETF, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index. We have also considered regression models both with and without ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. ***, **, and *, represent significance levels at 1%, 5%, and 10%, respectively.

DepVar.	***ETF_Excess_Ret***			
	[1]	[2]	[3]	[4]
ETF_IPO_Ret	**0.398*** **	**0.332*** **	**0.473*** **	**0.388*** **
	(0.042)	**(0.038)**	**(0.043)**	**(0.036)**
Controls	Yes	Yes	Yes	Yes
Fixed.Effects		Time	ETF	ETF, Time
Adj. R-squared	0.231	0.423	0.211	0.420
Num.Obs.	9,774			

Table 3: The impact of IPO participation on tracking errors

Table 3 reports the Panel OLS results analyzing the impact of ETFs' IPO participation on their tracking errors, i.e.,

$$\text{Tracking\_Error}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

The dependent variable *Tracking_Error* represents the monthly tracking error defined as the standard deviation of the daily tracking errors in the month. The daily tracking error is the difference between returns from the ETF and its benchmark index. *ETF_IPO_Ret* quantifies returns specifically from IPO participations. For each ETF, we define the monthly return from its IPO participation as $\text{ETF\_IPO\_Ret}_{i,t} = \sum_{j=1}^{J} \frac{\text{IPO\_Ret}_{j,t}}{\text{Size}_{i,t-1}}$, where *J* is the total number of IPOs the ETF *i* has subscribed by the end of month *t*. *IPO_Ret* is the IPO return. *Size* is the market capitalization of the ETF calculated as its outstanding shares times the net asset value at the end of each month. Controls include the natural logarithm ETF size, the number of IPOs by the ETF, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index. We have also considered regression models both with and without ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. ***, **, and *, represent significance levels at 1%, 5%, and 10%, respectively.

DepVar.	***Tracking_Error***			
	[1]	[2]	[3]	[4]
ETF_IPO_Ret	**0.025*** **	**0.019*** **	**0.031*** **	**0.024*** **
	(0.005)	**(0.004)**	**(0.005)**	**(0.005)**
Controls	Yes	Yes	Yes	Yes
Fixed.Effects		Time	ETF	ETF, Time
Time Fixed Effect				
Adj. R-squared	0.120	0.197	0.118	0.232
Num.Obs.	9,774			

Table 4: The impact of IPO participation on fund flow

Table 4 reports the Panel OLS results analyzing the impact of ETFs' IPO participation on their fund flow, i.e.,

$$\text{Flow}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \beta_2 \text{Flow}_{i,t-1} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

The dependent variable *Flow* represents the monthly fund flow for an ETF, which is the monthly change of the ETF' s total net asset value netting out its monthly return. *ETF_IPO_Ret* quantifies returns specifically from IPO participations. For each ETF, we define the monthly return from its IPO participation as $\text{ETF\_IPO\_Ret}_{i,t} = \sum_{j=1}^{J} \frac{\text{IPO\_Ret}_{j,t}}{\text{Size}_{i,t-1}}$, where *J* is the total number of IPOs the ETF *i* has subscribed by the end of month*t*. *IPO_Ret* is the IPO return. *Size* is the market capitalization of the ETF calculated as its outstanding shares times the net asset value at the end of each month. Controls include the natural logarithm ETF size, the number of IPOs by the ETF, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index. We add in the lagged *Flow* to control for the fund flow persistency. We have also considered regression models both with and without ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. ***, **, and *, represent significance levels at 1%, 5%, and 10%, respectively.

DepVar.	***Flow***			
	[1]	[2]	[3]	[4]
ETF_IPO_Ret	**2.902*** **	**2.778*** **	**3.813*** **	**3.722*** **
	(0.482)	**(0.496)**	**(0.021)**	**(0.628)**
Lag Flow	0.206***	0.207***	0.127***	0.125***
	(0.019)	(0.020)	(0.021)	(0.022)
Controls	Yes	Yes	Yes	Yes
Fixed.Effects		Time	ETF	ETF, Time
Adj. R-squared	0.062	0.085	0.028	0.064
Num.Obs.	9,771			

Table 5: The impact of IPO participation on ETF creations/redemptions

Table 5 Panel A reports the Panel OLS results on the contemporaneous correlation between ETF flow and creations/redemptions, i.e.,

$$\text{Flow}_{i,t} = \beta_1 \text{Creations/redemptions}_{i,t} + \beta_2 \text{Flow}_{i,t-1} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

The dependent variable *Flow* represents the monthly fund flow for an ETF, which is the monthly (or daily) change of the ETF' s total net asset value netting out its monthly return. *Creations/redemptions*is the mean value (or the value) of daily changes in ETF shares outstanding (Δ*Shares_Outstanding*) in month *t*. Control variables in column 1 are the same with that on table 4. Control variables in column 2 are daily (natural logarithm) ETF size, turnover ratio, (natural logarithm) ETF trading volume and lagged daily ETF flow.

Table 5 Panel B reports the Panel OLS results analyzing the impact of ETFs' IPO participation on their creations/redemptions, i.e.,

$$\text{Creations/redemptions}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \beta_2 \text{Creations/redemptions}_{i,t-1} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

The dependent variable*Creations/redemptions*is the mean value of daily changes in ETF shares outstanding (Δ*Shares_Outstanding*) in month *t* as the measure of monthly ETF creations/redemptions. *ETF_IPO_Ret* quantifies returns specifically from IPO participations. For each ETF, we define the monthly return from its IPO participation as $\text{ETF\_IPO\_Ret}_{i,t} = \sum_{j=1}^{J} \frac{\text{IPO\_Ret}_{j,t}}{\text{Size}_{i,t-1}}$, where *J* is the total number of IPOs the ETF *i* has subscribed by the end of month *t*. *IPO_Ret* is the IPO return. *Size* is the market capitalization of the ETF calculated as its outstanding shares times the net asset value at the end of each month. Controls include the ETF size, the number of IPOs by the ETF, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index. We add in the lagged *Creations/redemptions* to control for autocorrelation in ETF creations/redemptions. We have also considered regression models both with and without ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. ***, **, and *, represent significance levels at 1%, 5%, and 10%, respectively.

Panel A: Correlations between ETF flow andcreations/redemptions

Dep. Var	***Flow***	
	[1]	[2]
Creations/redemptions	**20.850*** **	1.006***
	(0.256)	(0.005)
Lag Flow	0.012***	0.013***
	(0.004)	(0.004)
Controls	Yes	Yes
Fixed.Effects	ETF, Time	ETF, Time
Adj. R-squared	0.929	0.968
Num.obs	9,771	199,545

Panel B: The impact of IPO participation on ETF creations/redemptions

DepVar.	*Creations/redemptions*			
	[1]	[2]	[3]	[4]
ETF_IPO_Ret	0.135***	0.140***	0.172***	0.185***
	(0.019)	(0.020)	(0.027)	(0.027)
Lag Creations/redemptions	0.193***	0.191***	0.118***	0.112***
	(0.016)	(0.016)	(0.018)	(0.018)
Controls	Yes	Yes	Yes	Yes
Fixed.Effects		Time	ETF	ETF, Time
Adj. R-squared	0.064	0.087	0.036	0.066
Num.Obs.	9,774			

Table 6: Cross-sectional comparison: Industry ETFs vs. market-index ETFs

Table 6 reports the Panel OLS results for $\text{ETF\_Excess\_Ret}_{i,t}, \text{Tracking\_Error}_{i,t}, \text{Flow}_{i,t}, \text{Creations/redemptions}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$ on subsample of industry and market-index ETFs, in which industry ETFs are categorized by WIND and market-index ETFs are the ones who tracing the main stock market index. *ETF_Excess_Ret* is defined as the difference between monthly returns from the ETF and the index it follows; *Tracking_Error* is the monthly tracking error. *Flow* is the fund flow for an ETF. *ETF_IPO_Ret* captures the return from ETF' s IPO participation. To test the cross-sectional variation of ETF IPO participation and its performance, this table also reports the Panel OLS results for $\text{ETF\_Excess\_Ret}_{i,t}, \text{Tracking\_Error}_{i,t}, \text{Flow}_{i,t}, \text{Creations/redemptions}_{i,t} = \beta_1 \text{ETF\_IPO\_Ret}_{i,t} + \beta_2 \text{ETF\_IPO\_Ret}_{i,t} \times \text{Dum\_industry\_ETF}_i + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$ *Dum_industry_ETF* equals one if the ETF is an industry ETF. We include the lagged natural logarithm ETF size, *ETF_IPO_Num*, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index as the control variable. We have considered regression models with ETF and time fixed effects. Standard errors are clustered by ETFs and reported in parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

DepVar.	***ETF_Excess_Ret***			***Tracking_Error***		
	Industry	***Market***	***Diff***	***Industry***	***Market***	***Diff***
	[1]	[2]	[3]	[4]	[5]	[6]
ETF_IPO_Ret	**0.625*** **	**0.276*** **	**0.280*** **	**0.049*** **	**0.012** **	**0.012** **
	(0.069)	**(0.037)**	**(0.035)**	**(0.006)**	**(0.006)**	**(0.006)**
ETF_IPO_Ret × Dum_Industry_ETF			**0.340*** **			**0.034*** **
			(0.064)			**(0.008)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed.Effects	ETF, Time	ETF, Time	ETF, Time	ETF, Time	ETF, Time	ETF, Time
Adj. R-squared	0.418	0.400	0.407	0.380	0.196	0.228
Num.obs	1699	3074	4773	1699	3074	4773
DepVar.	***Flow***			***Creations/redemptions***		
	Industry	***Market***	***Diff***	***Industry***	***Market***	***Diff***
	[1]	[2]	[3]	[4]	[5]	[6]
ETF_IPO_Ret	**6.605*** **	**2.524*** **	**2.436** **	**0.318*** **	**0.126*** **	**0.122** **
	(2.187)	(0.807)	**(0.756)**	**(0.093)**	**(0.035)**	**(0.032)**

ETF_IPO_Ret × Dum_Industry ETF			**5.746*** (1.991)**			**0.248*** (0.083)**
Lag_Flow (or Lag_Creation/redemption)	0.116*** (0.029)	0.086 (0.051)	0.104*** (0.033)	0.108*** (0.024)	0.086*** (0.041)	0.099*** (0.027)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed.Effects	ETF, Time	ETF, Time	ETF, Time	ETF, Time	ETF, Time	ETF, Time
Adj. R-squared	0.112	0.094	0.086	0.111	0.107	0.093
Num.obs	1699	3071	4770	1699	3074	4773

Table 7: Identify causality with the IV-2SLS regression

Table 7 reports the IV-2SLS results testing the causal relationship between the ETF' s return from IPO participation and the ETF' s excess return (or tracking error, or fund flow). The sample period is from January 2016 to July 2020 consisting of a subset of 46 ETFs. Those ETFs hold stocks only from either the Shanghai or Shenzhen Stock Exchange. The regression model is as follows,

$$\text{ETF\_IPO\_Ret}_{i,t} = \gamma_1 \text{Post}_t \times \text{Treat}_i + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

$$\text{ETF\_Excess\_Ret}_{i,t}, \text{Tracking\_Error}_{i,t}, \text{Flow}_{i,t}, \text{Creations/redemptions}_{i,t} = \beta_1 \text{ETF\_}\widehat{\text{IPO}}\text{\_Ret}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

Post is a time dummy variable, which takes one after July 2019, and zero otherwise. *Treat* is an ETF dummy variable, which is one for ETFs only hold stocks on the Shanghai Stock Exchange, but zero for ETFs only hold stocks on the Shenzhen Stock Exchange. We include the natural logarithm ETF size, *ETF_IPO_Num*, the age and reciprocal price of the ETF, and the return from the Shanghai Stock Exchange composite index as control variables. For the regression on *Flow*, we add an additional control variable the lagged *Flow* to control for the autocorrelation in *Flow*. We have also considered ETF and time fixed effects. Standard errors are clustered by ETFs and reported in the parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

Dep.Var	**1st stage**	**2nd stage**			
	ETF_IPO_Ret	***ETF_Excess***	***Tracking_Error***	***Flow***	***Creation_ Redemption***
	[1]	[2]	[3]	[4]	[5]
Post× Treat	1.190***				
	(0.055)				
$\widehat{ETF\ IPO\ Ret}$		**0.599*** **	**0.064*** **	**9.087*** **	**0.400*** **
		(0.044)	**(0.005)**	**(1.468)**	**(0.066)**
Lag Flow				0.070***	
				(0.026)	
Lag Creation_Redemption					0.058**
					(0.025)
Controls	Yes		Yes		
Fixed.Effects	ETF, Time		ETF, Time		
Num.Obs.	1,805		1,949		
F-Test of Excluded Instruments	453.69				

Table 8: ETF IPO participation on current stock volatility changes

Table 8 reports the IV-2SLS results analyzing the causal relationship between the ETF' s performance of IPO parrticipation and the contemporaneous volatility change of the member stocks. The sample period is from January 2016 to July 2020 consisting of a subset of 46 ETFs. Those ETFs hold stocks only from either the Shanghai or Shenzhen Stock Exchange. The regression model is as follows,

$$\text{ETF\_Performance}_{s,t} = \gamma_1 \text{Post}_t \times \text{Treat}_s + \text{Controls} + \text{Fixed Effects} + \eta_{s,t}.$$

$$\Delta\text{Volatility}_{s,t} = \beta_1 \widehat{\text{ETF\_Performance}}_{s,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{s,t}.$$

ETF_Performance includes the weighted sum of excess return, tracking error, fund flow and creation and redemption activities of the ETF *i* who holds the stocks, and the weight is each ETF' s holding shares of the stocks divided by total shares held by all ETFs. *Δ Volatility* is the change of monthly volatility, where monthly volatility is 100 times the annualized standard deviation of the daily stock return in a month. *Post* is a time dummy variable, which takes one after July 2019, and zero otherwise. *Treat* is an ETF dummy variable, which is one for the constituent stock from ETFs only hold stocks on the Shanghai Stock Exchange, and zero for constituent stocks from ETFs purely hold stocks on the Shenzhen Stock Exchange. For the stock level control variable, we include the commonly used characteristics variable, such as the market capitalization, leverage ratio, ROE, institution shares, PE ratio, turnover, and natural logarithm of trading volume. We have also considered ETF and time fixed effects. Standard errors are clustered by stocks and reported in the parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

Dep.Var.	**1st Stage**			**2nd Stage**		
	ETF_Excess_Ret	***Tracking Error***	***Creation_ Redemption***	***Δ Volatility(t)***		
	[1]	[2]	[3]	[4]	[5]	[6]
Post× Treat	0.452***	5.552***	0.117***			
	(0.014)	(0.228)	(0.007)			
$\widehat{ETF\_Excess\_Ret}$				0.613***		
				(0.102)		
$\widehat{Tracking\_Error}$					0.050***	
					(0.009)	
$\widehat{Creation\_Redemption}$						2.363***
						(0.403)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed.Effects			Stock, Time			
No.obs		55,224			55,224	
F-Test of Excluded Instruments	1016.61	593.24	270.08			

Table 9: ETF performance on subsequent stock volatility changes

Table 9 reports the IV-2SLS results analyzing the causal relationship between the ETF' s performance of IPO participation and the subsequent volatility change of the member stocks. The sample period is from January 2016 to July 2020 consisting of a subset of 46 ETFs. Those ETFs hold stocks only from either the Shanghai or Shenzhen Stock Exchange. The regression model is as follows,

$$\text{ETF\_Performance}_{s,t} = \gamma_1 \text{Post}_t \times \text{Treat}_s + \text{Controls} + \text{Fixed Effects} + \eta_{s,t}.$$

$$\Delta\text{Volatility}_{s,t+1} = \beta_1 \widehat{\text{ETF\_Performance}}_{s,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{s,t}.$$

ETF_Performance includes the weighted sum of excess return, tracking error, fund flow and creation and redemption activities of the ETF *i* who holds the stocks, and the weight is the weight is each ETF' s holding share of the stocks divided by total shares held by all ETFs. *Δ Volatility* is the change of monthly volatility, where monthly volatility is 100 times the annualized standard deviation of the daily stock return in a month. *Post* is a time dummy variable, which takes one after July 2019, and zero otherwise. *Treat* is an ETF dummy variable, which is one for the constituent stock from ETFs only hold stocks on the Shanghai Stock Exchange, and zero for constituent stocks from ETFs purely hold stocks on the Shenzhen Stock Exchange. For the stock level control variable, we include the commonly used characteristics variable, such as the market capitalization, leverage ratio, ROE, institution shares, PE ratio, turnover, and natural logarithm of trading volume. We have also considered ETF and time fixed effects. Standard errors are clustered by stocks and reported in the parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

Dep.Var.	**1st Stage**			**2nd Stage**		
	ETF_Excess_Ret	***Tracking Error***	***Creation_ Redemption***	***Δ Volatility(t+1)***		
	[1]	[2]	[3]	[4]	[5]	[6]
Post× Treat	0.452***	5.552***	0.068***			
	(0.014)	(0.227)	(0.007)			
$\widehat{ETF\_Excess\_Ret}$				-1.022***		
				(0.136)		
$\widehat{Tracking\_Error}$					-0.083***	
					(0.012)	
$\widehat{Creation\_Redemption}$						-3.938***
						(0.545)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed.Effects			Stock, Time			
No.obs		55,224			55,224	
F-Test of Excluded Instruments	1016.61	593.24	270.08			

Table 10: ETF performance on current stock return

Table 10 reports the IV-2SLS results analyzing the causal relationship between the ETF' s performance and the contemporaneous or subsequent return of the member stocks. The sample period is from January 2016 to July 2020 consisting of a subset of 46 ETFs. Those ETFs hold stocks only from either the Shanghai or Shenzhen Stock Exchange. The regression model is as follows,

$$\text{ETF\_Performance}_{s,t} = \gamma_1 \text{Post}_t \times \text{Treat}_s + \text{Controls} + \text{Fixed Effects} + \eta_{s,t}.$$

$$\text{Returns}_{s,t}, \text{Returns}_{s,t+1} = \beta_1 \widehat{\text{ETF\_Performance}}_{s,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{s,t}.$$

ETF_Performance includes the weighted sum of excess return, tracking error, fund flow and creation and redemption activities of the ETF *i* who holds the stocks, and the weight is the weight is each ETF' s holding share of the stocks divided by total shares held by all ETFs. *Return* includes the monthly market-adjusted return (by substracting monthly market return) and its adjusted form by Fama-French 3 Factors Model, Carhart 4 Factors Model and Fama-French 5 Factor Model of the member stocks. *Post* is a time dummy variable, which takes one after July 2019, and zero otherwise. *Treat* is an ETF dummy variable, which is one for the constituent stock from ETFs only hold stocks on the Shanghai Stock Exchange, and zero for constituent stocks from ETFs purely hold stocks on the Shenzhen Stock Exchange. For the stock level control variable, we include the commonly used characteristics variable, such as the market capitalization, leverage ratio, ROE, institution shares, PE ratio, turnover, and natural logarithm of trading volume. For the macro level control variable, we include the market return. We have also considered ETF and time fixed effects. Standard errors are clustered by stocks and reported in the parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

Panel A: ETF Excess Return on its constituent stock return

Dep. Var	***Return***				***Return(t+1)***			
	Mkt-adj	***FF3***	***CH4***	***FF5***	***Mkt-adj***	***FF3***	***CH4***	***FF5***
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
$\widehat{ETF\_Excess\_Ret}$	1.607***	1.216***	1.624***	1.942***	-1.675***	-1.887***	-1.572***	-1.070***
	(0.475)	(0.450)	(0.463)	(0.478)	(0.515)	(0.489)	(0.485)	(0.472)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Stock, Time				Stock, Time			
No.Obs	55,224				55,224			

Panel B: ETF Tracking Error on its constituent stock return

Dep. Var	*Return*				*Return(t+1)*			
	Mkt-adj	*FF3*	*CH4*	*FF5*	*Mkt-adj*	*FF3*	*CH4*	*FF5*
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
$\widehat{Tracking\_Error}$	0.131***	0.099***	0.132***	0.158***	-0.136***	-0.153***	-0.128***	-0.087***
	(0.038)	(0.037)	(0.038)	(0.039)	(0.043)	(0.040)	(0.039)	(0.039)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Stock, Time				Stock, Time			
No.Obs	55,224				55,224			

Panel C: ETF Creation and Redemption on its constituent stock return

Dep. Var	*Return*				*Return(t+1)*			
	Mkt-adj	*FF3*	*CH4*	*FF5*	*Mkt-adj*	*FF3*	*CH4*	*FF5*
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
$\widehat{Creation\_Redemption}$	6.199***	4.681***	6.252***	7.485***	-6.454***	-7.277***	-6.061***	-4.136***
	(1.860)	(1.740)	(1.802)	(1.841)	(1.9918)	(1.899)	(1.880)	(1.839)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Stock, Time				Stock, Time			
No.Obs	55,224				55,224			

Table 11: ETF IPO participation and investment-*q* sensitivity

This table presents IV-2SLS results analyzing the causal relationship between the creations and redemptions generated by the ETF' s IPO participation and investment-*q* sensitivity of the member stocks. The sample period is from first qurter on year 2016 to the lst quarter of 2020 consisting of a subset of 46 ETFs. Those ETFs hold stocks only from either the Shanghai or Shenzhen Stock Exchange. The regression model is as follows,

$$\text{Creation\_Redemption}_{s,q-1} = \gamma_1 \text{Post}_{q-1} \times \text{Treat}_s + \gamma_2 \text{Post}_{q-1} \times \text{Treat}_s \times \text{Q}_{s,q-1} + \text{Controls} + \text{Fixed Effects} + \eta_{s,q-1},$$

$$\text{Creation\_Redemption}_{s,q-1} \times \text{Q}_{s,q-1} = \theta_1 \text{Post}_{q-1} \times \text{Treat}_s + \theta_2 \text{Post}_{q-1} \times \text{Treat}_s \times \text{Q}_{s,q-1} + \text{Controls} + \text{Fixed Effects} + \eta_{s,q-1},$$

$$\text{Investment}_{s,q} = \beta_1 \widehat{\text{Creation\_Redemption}}_{s,q-1} + \beta_2 \widehat{\text{Creation\_Redemption}_{s,q-1} \times \text{Q}_{s,q-1}} + \beta_3 \text{Q}_{s,q-1} + \text{Controls} + \text{Fixed Effects} + \eta_{s,q},$$

Quarterly creation and redemption is mesuared as the quarterly changes in ETF shares outstanding ($\Delta Shares\_Outstanding$), *and Creation_Redemption* is the weighted sum of quarterly creation and redemption activities of the ETF *i* who holds the stocks, and the weight is each ETF' s holding shares of the stocks divided by total shares held by all ETFs. *Investment* is firm's quarterly investment measured by the sum of capital expenditures and R&D expenses, all scaled by total assets. *Q* is firm's quarterly Tobin's *q,* defined as the market value of equity plus the book value of asset minus the book value of equity, scaled by the book value of assets at the end of the previous quarter. *Post* is a time dummy variable, which takes one after 2019Q2, and zero otherwise. *Treat* is an ETF dummy variable, which is one for the constituent stock from ETFs only hold stocks on the Shanghai Stock Exchange, and zero for constituent stocks from ETFs purely hold stocks on the Shenzhen Stock Exchange. Following Antoniou et al. (2023), we include the stock level control variables: ETF Ownership and its intercation with Tobin's *q*, cash flow and an its interaction with ETF Ownership, size and its interaction with Tobin's *q*, residual istitutional ownership after orthogonalizing it to ETF ownerhip and its interaction with Tobin's *q,* annulaized stock returns over next four quarters, Leverage, Cash holdings, return on assets, Sales Growth Rate, inverse of total assests. We have also considered stock and time (year-quarter) fixed effects. Standard errors are clustered by stocks and reported in the parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

	1st Stage		**2nd Stage**	
Dep.Var.	***Crea_Redm***	***Crea_Redm× Q***	***Investment***	
	[1]	[2]	[3]	[4]
Post× Treat	**0.050****	**0.303*****		
	(0.018)	**(0.048)**		
$\widehat{Crea\_Redm}$			1.225	1.257
			(1.508)	(1.518)
$\widehat{Crea\_Redm} \times Q$			**-1.024****	**-0.902****
			(0.448)	**(0.447)**
Q	0.010	0.545	4.356***	4.909***
	(0.118)	(0.510)	(1.254)	(1.263)
Q× Post× Treat	-0.001	-0.116***		
	(0.008)	(0.033)		
ETF_Ownership				-0.282**
				(0.120)
Q× ETF_Ownership				0.177***

				(0.060)
Controls	Yes	Yes	Yes	Yes
Fixed.Effects		Stock, Time		
No.Obs	11,911	11,911	11,911	11,911

Table 12: IPO participation of index mutual funds and their performance

Table 12 reports the IV-2SLS results testing the causal relationship between the Passive Index Mutual Funds' IPO participation and its excess returns, tracking errors and fund flow. he sample period is from January 2016 to July 2020 consisting of a subset of 22 the Passive Index Mutual Funds. Those Funds hold stocks only from either the Shanghai or Shenzhen Stock Exchange. The regression model is as follows,

$$\text{Fund\_IPO\_Ret}_{i,t} = \gamma_1 \text{Post}_t \times \text{Treat}_i + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

$$\text{Fund\_Excess\_Ret}_{i,t}, \text{Tracking\_Error}_{i,t}, \text{Flow}_{i,t}, \text{Creations/redemptions}_{i,t} = \beta_1 \widehat{\text{Fund\_IPO\_Ret}}_{i,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{i,t}.$$

Post is a time dummy variable, which takes one after July 2019, and zero otherwise. *Treat* is an Fund dummy variable, which is one for Passive Index Mutual Funds only hold stocks on the Shanghai Stock Exchange, but zero for Passive Index Mutual Funds only hold stocks on the Shenzhen Stock Exchange. We include the natural logarithm ETF size, *Fund_IPO_Num*, the age and reciprocal price of the Passive Index Mutual Funds, and the return from the Shanghai Stock Exchange composite index as control variables. For the regression on *Flow*, we add an additional control variable the lagged *Flow* to control for the autocorrelation in *Flow*. We have also considered Fund and time fixed effects. Standard errors are clustered by Funds and reported in the parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

Dep. Var	**1st stage**	**2nd stage**		
	Fund_IPO_Ret	***Fund_Excess***	***Tracking_Error***	***Flow***
	[1]	[2]	[3]	[4]
Post× Treat	0.589***			
	(0.155)			
$\widehat{Fund\ IPO\ Ret}$		**1.054*** **	**0.076*** **	**7.872**
		(0.330)	**(0.018)**	**(9.972)**
Lag Flow				-0.000
				(0.040)
Lag Creation_Redemption				
Controls	Yes			
Fixed.Effects	Fund, Time			
Num.Obs.	7,04			
F-Test of Excluded Instruments	14.52			

Appendix Table 1: Summary Statistics for the IV-2SLS Panel

Panel A: Summary statistics for the Fund-Month Panel

	Mean	Std	5%	25%	50%	75%	95%
Size (billion RMB)	0.767	2.791	0.019	0.043	0.089	0.231	2.328
100× Tracking_Error (%)	5.637	6.763	0.799	1.909	3.488	6.303	18.398
ETF_Excess_Ret (%)	0.231	0.608	-0.304	-0.064	0.070	0.365	1.366
ETF_IPO_Num	4.316	5.690	0	0	2	7	17
ETF_IPO_Ret (%)	0.292	0.689	0.000	0.000	0.013	0.208	1.658
Flow(%)	1.600	16.267	-14.408	-3.239	0.000	2.209	25.344
Creation_Redemption(%)	0.062	0.724	-0.693	-0.157	0.000	0.115	1.190

Panel B: Summary statistics for the Stock-Month Panel

	Mean	Std	5%	25%	50%	75%	95%
100× Tracking_Error (%)	5.441	5.967	1.130	1.929	3.323	6.659	15.351
ETF_Excess_Ret (%)	0.283	0.505	-0.193	-0.011	0.136	0.404	1.201
Flow(%)	-0.060	5.819	-7.490	-2.614	-0.730	1.334	10.301
Creation_Redemption(%)	0.000	0.281	-0.405	-0.128	-0.031	0.068	0.490
Volatility(%)	7.955	3.684	3.209	5.181	7.223	10.099	15.213
Return(%)	-0.154	10.314	-15.419	-6.163	-0.834	5.032	18.333
Return Mkt-adj (%)	-0.088	8.437	-12.200	-5.370	-1.150	4.080	15.670
Return FF3(%)	-0.518	8.150	-12.847	-5.389	-1.232	3.469	14.343
Return CH4(%)	-0.507	8.132	-12.842	-5.361	-1.177	3.466	14.289
Return FF5(%)	-0.478	8.087	-12.785	-5.307	-1.120	3.540	14.101

Panel C: Summary statistics for the Stock-Quarter Panel

	Mean	Std	5%	25%	50%	75%	95%
Flow(%)	0.074	0.274	-0.203	-0.045	0.000	0.102	0.685
Creation_Redemption(%)	0.048	0.222	-0.215	-0.045	0.009	0.101	0.387
Investment	0.728	1.482	0	0	0.032	0.899	4.003
Q	1.959	1.854	1.229	1.574	2.210	5.032	18.333
ETF Ownership(%)	0.182	0.409	0.002	0.005	0.016	0.146	0.956

Appendix Table 2: ETF performance on its constituent stock' s Idiosyncratic Volatility

This table reports the IV-2SLS results analyzing the causal relationship between the ETF' s performance and the contemporaneous or subsequent volatility of the member stocks. The sample period is from January2016 to July 2020 consisting of a subset of 49 ETFs. Those ETFs hold stocks only from either the Shanghai or Shenzhen Stock Exchange. The regression model is as follows,

$$\text{ETF\_Performance\_Ret}_{s,t} = \gamma_1 \text{Post}_t \times \text{Treat}_s + \text{Controls} + \text{Fixed Effects} + \epsilon_{s,t}.$$

$$\text{Volatility}_{s,t}, \text{Volatility}_{s,t+1} = \beta_1 \widehat{\text{ETF\_Performance\_Ret}}_{s,t} + \text{Controls} + \text{Fixed Effects} + \epsilon_{s,t}.$$

$ETF\_Performance\_Ret_{s,t}$ *includes*the weighted sum of excess return, tracking error, fund flow and creation and redemption activities of the ETF *i*who holds the stock s, and the weight is the holding percentage of ETF*i*. ***Volatility*** are themonthly volatility, which is 100 times the annualized standard deviation of the daily stock return in a month, and the square ofmonthly return' s adjusted form by Fama-French 3 Factors Model, Carhart 4 Factors Model and Fama-French 5 Factor Model of the member stocks. *Post*is a time dummy variable, which takes one after July 2019, and zero otherwise. *Treat*is a dummy variable, which is one for the constituent stock from ETFs only hold stocks on the Shanghai Stock Exchange, and zero for constituent stock s from ETFs purely hold stocks on the Shenzhen Stock Exchange. For the stock level control variable, we include the commonly used characteristics variable, such as the market capitalization, leverage ratio, ROE, institution shares, PE ratio, turnover, and natural logarithm of trading volume. We add an additional control variable the lagged*volatility* to control for the autocorrelation in *volatility*. We have also considered stock and time fixed effects. Standard errors are clustered by stocks and reported in the parentheses. *** is significant at 1%, ** is significant at 5%, and * is significant at 10%.

	Panel A: ETF Excess Return on its constituent stock volatility							
Dep. Var	***Volatility***				***Volatility (t+1)***			
	Raw	***IdioVol_FF3***	***IdioVol _CH4***	***IdioVol _FF5***	***Raw***	***IdioVol_FF3***	***IdioVol _CH4***	***IdioVol _FF5***
	[1]	***[2]***	***[3]***	***[4]***	***[5]***	***[6]***	***[7]***	***[8]***
$\widehat{ETF\_Excess\_Ret}$	0.580***	0.876***	0.912***	0.797***	-0.537***	-0.604**	-0.538*	-0.700 **
	(0.142)	(0.297)	(0.297)	(0.293)	(0.141)	(0.305)	(0.302)	(0.302)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Stock, Time				Stock, Time			
No.Obs	55,224				55,224			

Panel B: ETF Tracking Error on its constituent stock return

	Volatility				*Volatility (t+1)*			
Dep. Var	***Raw***	***IdioVol_FF3***	***IdioVol _CH4***	***IdioVol _FF5***	***Raw***	***IdioVol_FF3***	***IdioVol _CH4***	***IdioVol _FF5***
	[1]	***[2]***	***[3]***	***[4]***	***[5]***	***[6]***	***[7]***	***[8]***
$\widehat{Tracking\_Error}$	0.047***	0.071***	0.074***	0.065***	-0.044***	-0.049**	-0.044*	-0.057**
	(0.012)	(0.024)	(0.024)	(0.024)	(0.012)	(0.025)	(0.025)	(0.025)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Stock, Time				Stock, Time			
No.Obs	55,224				55,224			

Panel C: ETF Creation and Redemption on its constituent stock return

	Volatility				*Volatility (t+1)*			
Dep. Var	***[1]***	***[2]***	***[3]***	***[4]***	***[5]***	***[6]***	***[7]***	***[8]***
	Raw	***IdioVol_FF3***	***IdioVol _CH4***	***IdioVol _FF5***	***Raw***	***IdioVol_FF3***	***IdioVol _CH4***	***IdioVol _FF5***
$\widehat{Creation\_Redemption}$	2.235***	3.385***	3.524***	3.077***	-2.077***	-2.333**	-2.075*	-2.697**
	(0.558)	(1.153)	(1.149)	(1.138)	(0.546)	(1.188)	(1.177)	(1.180)
Conrtols	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Stock, Time				Stock, Time			
No.Obs	55,224				55,224			

Appendix Table 3: Summary statistics: Industry ETFs' participation on the industry IPOs

Appendix Table 3 provides the summary statistics on the industry ETFs' participation on the industry IPOs. Panel A reports the monthly participation of industry ETFs in the IPOs. For each month, *IETF_IIPO_Num* is the number of industry ETFs participating in the IPOs of stocks within the same industry. *IETF_IPO_Num* is the number of industy ETFs participating in any IPO during the month. *IETF_IIPO_rate* is calculated by dividing *IETF_IIPO_Num* by *IETF_IPO_Num*. Panel B reports the participation of industry ETFs in IPOs at the ETF level. *IETF_IIPOs* is the number of new stocks in the same industry successfully acquired by industry ETFs through IPO participation. *IETF_IPOs* is the total number of IPOs acquired by the industry ETFs. *IETF_IIPOs_rate* is calculated by dividing *IETF_IIPOs* by *IETF_IPOs*.

Panel A: Summary statistics

	Mean	**Std**	**5%**	**25%**	**50%**	**75%**	**95%**	**Count**
IETF_IIPO_Num	3.458	2.997	0	1	3	5	9.450	72
IETF_IPO_Num	19.875	10.256	5.750	13	17.5	28.25	40	72
IETF_IIPO_rate	0.162	0.098	0	0.100	0.160	0.225	0.327	72

Panel B: Summary statistics

	Mean	**Std**	**5%**	**25%**	**50%**	**75%**	**95%**	**Count**
IETF_IIPOs	13	28.036	0	0	0	11.250	77.100	42
IETF_IPOs	605.762	379.145	110.6	300	537	843.250	1277.800	42
IETF_IIPOs_rate	0.021	0.034	0	0	0	0.029	0.094	42

Appendix Table 4: Number of ETFs tracking the same index

Tracking Index code	Tracking index name	Number of ETFs
000905.SH	CSI SmallCap 500 index	26
000300.SH	CSI 300 INDEX	22
000852.SH	CSI 1000 Index	15
399006.SZ	ChiNext Index	15
931643.CSI	CSI STAR&CHINEXT 50 Index	14
932000.CSI	CSI 2000 Index	14
399975.SZ	CSI All Share Investment Banking & Brokerage Index	12
000688.SH	SSE Science and Technology Innovation Board 50 Index	11
000016.SH	SSE 50 Index	10
000903.SH	CSI 100 index	10
930050.CSI	CSI A50 Index	10
931151.CSI	CSI Photovoltaic Industry Index	9
399986.SZ	CSI Banks Index	9
000698.SH	SSE Science and Technology Innovation Board 100 Index	8
931755.CSI	CSI SEEE Carbon Neutral Index	8
716567.CSI	MSCI China A Inclusion RMB Index(CNY)	7
931152.CSI	CSI Brand Name Drug Industry Index	7
H30597.CSI	CSI New Materials Index	7
399330.SZ	SHENZHEN 100 INDEX	7
399303.SZ	CNI 2000 INDEX	6
H30007.CSI	CSI Chip Industry Index	6
931494.CSI	CSI Consumer Electronics Thematic Index	6
000922.CSI	CSI Dividend Index	6
H30199.CSI	CSI All Share Electric Utilities Index	5
000977.CSI	CSI China Mainland Low Carbon Economy Index	5
980032.CNI	CNI NEV Battery Index	5
930712.CSI	CSI Internet of Things Index	5
H30178.CSI	CSI All Share Health Care Equipment & Services Index	5
735577.MI	MSCI China A 50 Connect Index	5
000932.SH	CSI Consumer Staples index	5
930721.CSI	CSI Intelligent Vehicle Index	5
H30269.CSI	CSI Dividend Low Volatility Index	5
H30590.CSI	CSI Robot Index	5

930851.CSI	CSI Cloud Computing & Big Data Index	5
399808.SZ	CSI New Energy Index	5
399976.SZ	CSI New Energy Vehicles Index	5
000813.CSI	CSI Chemicals Sub-industry Index	5
H30455.CSI	CSI SH-HK-SZ 500 INDEX	5
H11052.CSI	CSI Intelligent Electric Vehicles Index	4
399019.SZ	SZSE ChiNext Mid Cap 200 Index	4
H30217.CSI	CSI All Share Health Care Equipment & Supplies Index	4
000861.CSI	CSI Central-SOEs Technological Innovation Index	4
931409.CSI	CSI SH-HK-SZ Brand Name Drug Industry Index	4
930955.CSI	CSI Dividend Low Volatility 100 Index	4
CN5075.CNI	CNI Information Technology Innovation Index	4
931463.CSI	CSI 300 ESG Index	4
399967.SZ	CSI National Defense Industry Index	4
930743.CSI	CSI Biotechnology Thematic Index	4
930625.CSI	CSI SH-HK-SZ Internet Index	4
931719.CSI	CSI Battery Thematic Index	4
930632.CSI	CSI Rare Metals Industry Index	4
930598.CSI	CSI Rare Earth Industry Index	4
930641.CSI	CSI Traditional Chinese Medicine Index	4
931230.CSI	CSI Auto Components Thematic Index	4
399989.SZ	CSI Medical Service Index	4
980015.CNI	CNI Vaccine and Biotechnology Index	4
980017.SZ	CNI Semiconductor Chips	4
980017.CNI	CNI Semiconductor Chips	4
930707.CSI	CSI Livestock Breeding Index	4

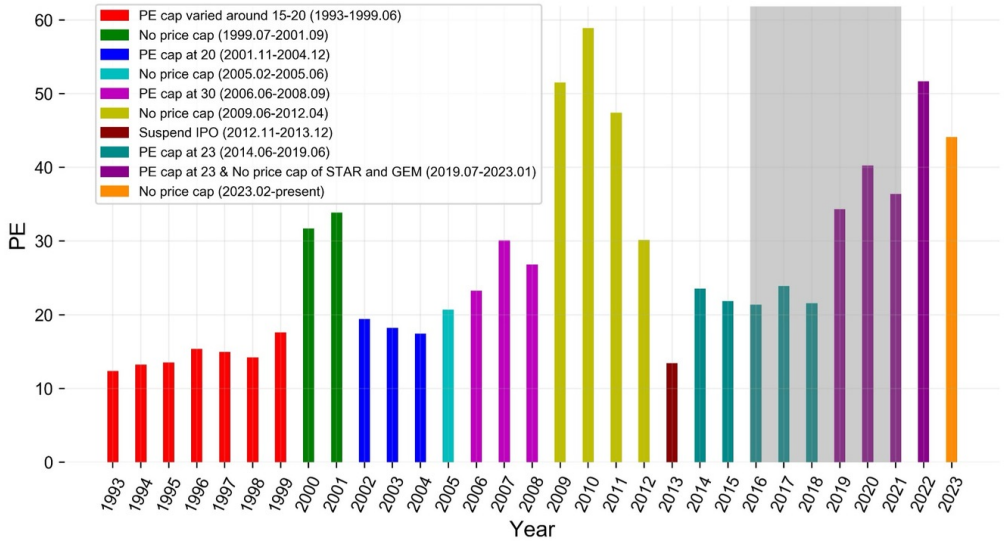

Figure 1: Pricing regulation on Chinese IPOs

Figure 1 summarizes the regulation on IPOs in terms of pricing since the formation of the CSRC. The vertical axis represents PE (the price-earnings ratio), the measure of pricing regulations. The PE bin, for example, shows the PE cap varied around 15-20 during 1993 to June 1999. There is binding PE ratio with the cap is 23 during June 2014 to June 2019. The CSRC relax restrictions on IPO pricing with no price cap under the new registration system (STAR market starting in July 2019 and GEM board since August 24, 2020), while the PE of SSE and old GEM IPOs are subject to the cap of 23 during July 2019 to January 2023. No price cap is imposed since February 2023 to present under the full registration system.

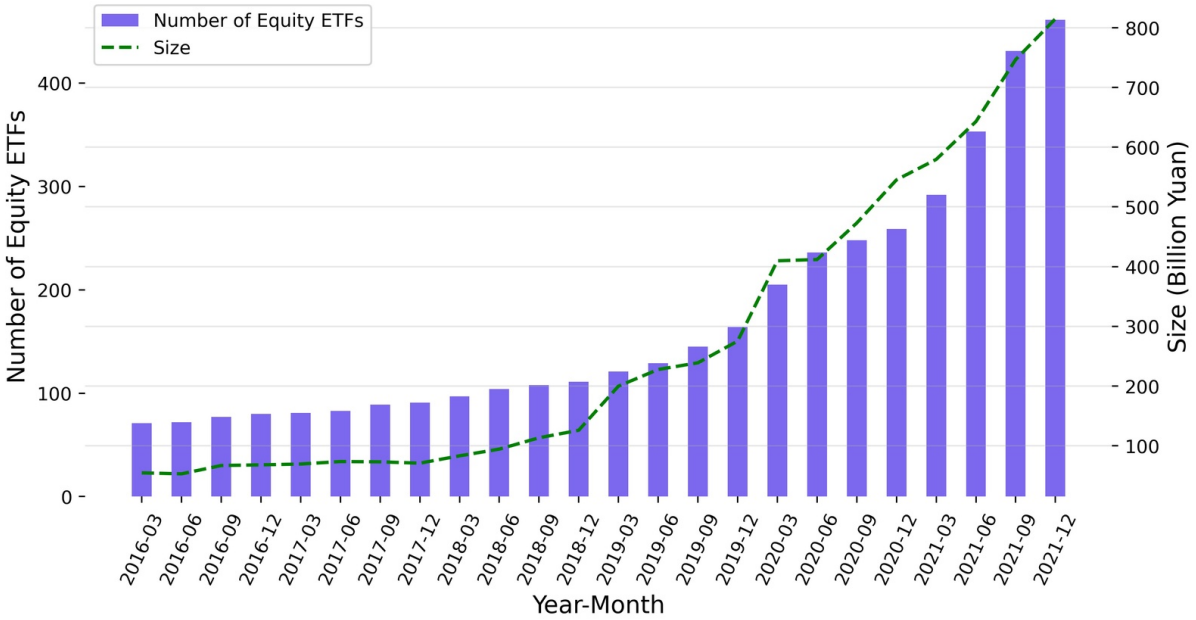

Figure 2: The growth of ETFs in China

Figure 2 shows the growth of equity ETFs in China during our sample period. The left vertical axis is the number of ETFs, and the right vertical axis is the size in (billions of RMB). We have 461 equity ETFs on December 2021.

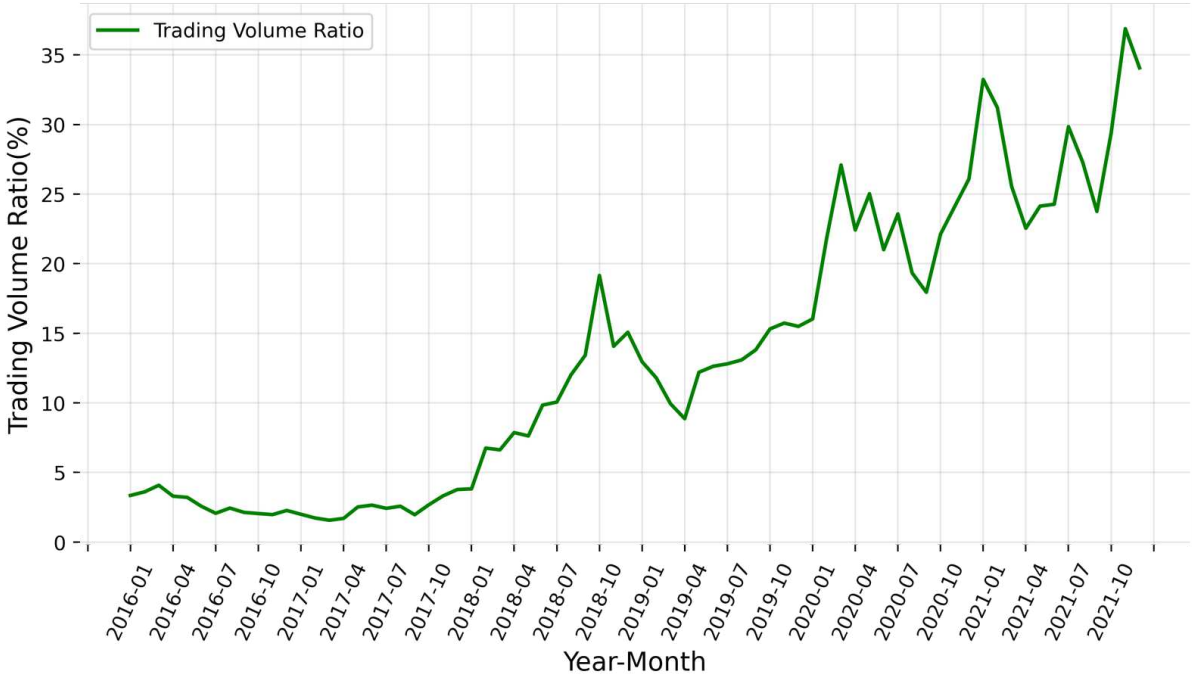

Figure 3: Equity ETFs/A-share volume ratio

Figure 3 shows proportion of monthly trading volume of equity ETFs to A-share trading volume in China during our sample period. The left vertical axis is the ratio of equity ETFs' trading volume to A-share trading volume.

Figure 4: Equity ETFs / A-share market capitalization ratio

Figure 4 shows proportion of monthly market capitalization of equity ETFs to A-share in China during our sample period. The left vertical axis is the ratio of equity ETFs' market capitalization to A-share market capitalization.