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Passing on the hot potato: the use of ETFs by open-ended funds to manage redemption requests

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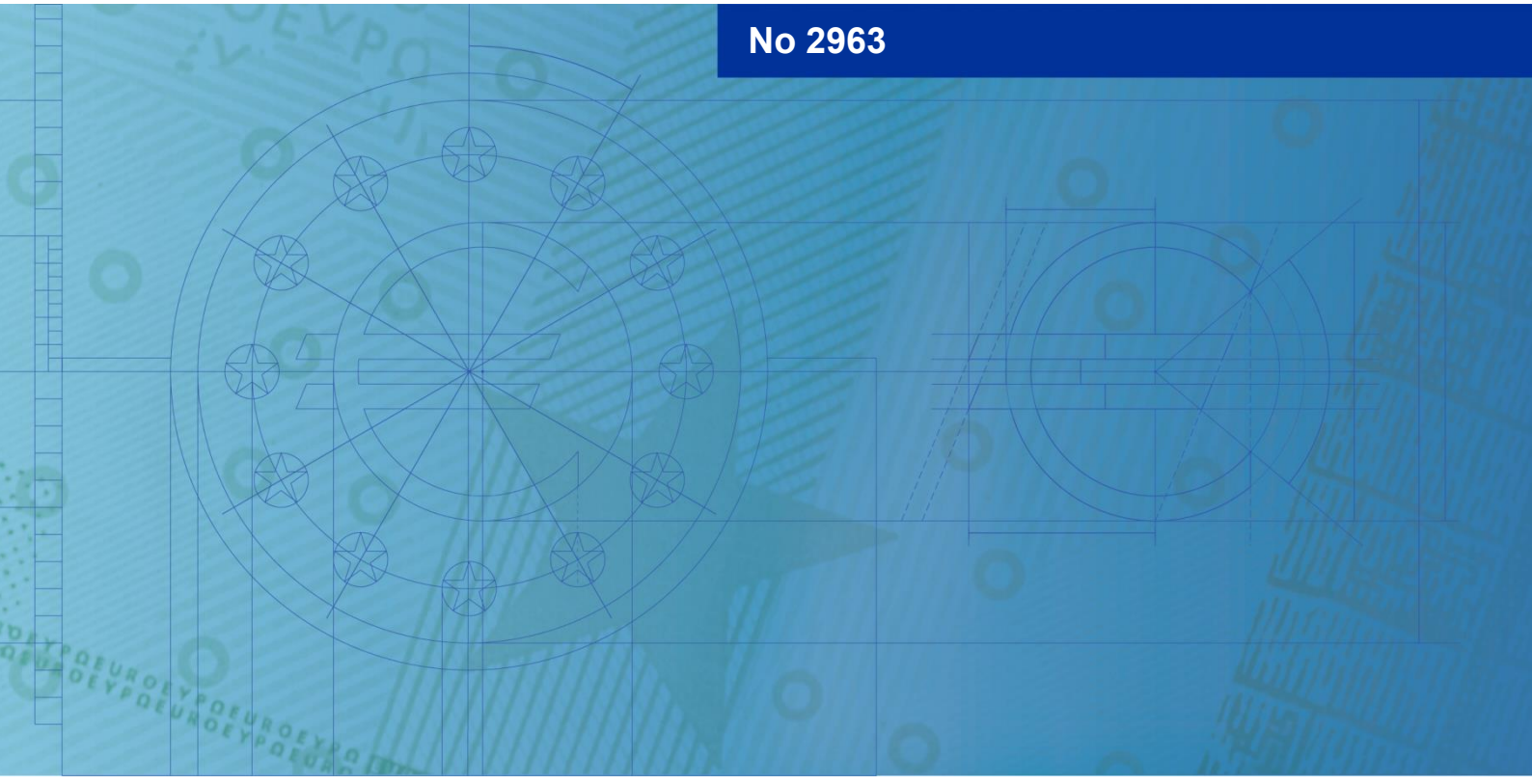

Abstract

This paper examines the use of ETFs by open-ended investment funds in the euro area to manage liquidity. We find that during the COVID-19 market turmoil, investment funds were the most run-prone investor type in the market for ETFs. We also show that open-ended funds that faced larger outflows in March 2020 scaled down their ETF holdings by a larger amount. These results are consistent with open-ended funds passing on their outflows to the ETF shares they held. Since open-ended investment funds are the largest group of ETF investors in the euro area, their trading can materially impact primary ETF flows during times of stress.

JEL Codes: G01, G11, G23

Keywords: Exchange-traded funds, cross-fund holdings, liquidity management, COVID-19 pandemic

Non-technical summary

The market for exchange-traded funds (ETFs) in the euro area has grown significantly in the last decade, with aggregate total net assets reaching 1.5 trillion euros by the end of 2023. During the COVID-19 market turmoil in March 2020, ETFs suffered from significant redemptions and the spread between ETF share prices and net asset values widened substantially (European Central Bank, 2020). Most of the redemptions came from the investment fund sector which represents the largest class of investors in ETFs in the euro area, followed by households as well as insurance companies and pension funds. Reasons why investment funds invest in ETFs may include the low-cost diversification opportunities provided by ETFs, as well as the intraday liquidity that ETFs offer. This paper investigates the use of ETFs by open-ended investment funds and assesses to what extent open-ended funds contributed to the large ETF redemptions in the primary market during the COVID-19 market turmoil.

Our first finding shows that the investment fund sector was the most run-prone investor type in ETFs during this period. By comparing the behaviour of different investor types within a given ETF during the first quarter of 2020, we find that investment funds scaled down their ETF holdings to a significantly larger extent than households as well as insurance companies and pension funds. These results are in line with recent findings for open-ended equity and corporate bond funds (Fricke et al., 2022; Allaire et al., 2023): also for these funds, the investment fund sector appears to be the most run-prone investor type.

The large ETF sales by open-ended investment funds could be driven by the fact that those funds are themselves prone to investor redemptions. To test this conjecture, we link open-ended investment funds' ETF sales to the outflows they faced during March 2020. To rule out that our results are driven by ETF characteristics, we compare the selling behaviour by different open-ended funds within a given ETF. The results show that, consistent with our hypothesis, open-ended funds that faced larger net outflows during March 2020 were also larger sellers of ETF shares during the same month, suggesting that funds sold ETFs to accommodate their outflows. We furthermore show that for funds investing both in mutual fund shares as well as ETF shares, an increase in net outflows during March 2020 is associated with a larger reduction in ETF share holdings relative to holdings in mutual fund shares, which may be explained by the intraday liquidity offered by ETFs.

The finding that investment funds were the most run-prone investor type raises the question

whether ETFs whose investor base consists of a larger part of investment funds faced larger net redemptions in the primary market. This does not necessarily have to be the case as investment funds cannot directly redeem ETF shares but have to sell their ETF shares in the secondary market instead. Still, the large ETF sales by investment funds may lead to an imbalance in the supply of and demand for ETF shares in the secondary market, which could lead authorized participants to redeem ETF shares in the primary market. This is indeed what we find: ETFs whose investor base consists to a larger extent of investment funds experienced significantly larger net redemptions in the primary market during the COVID-19 pandemic relative to ETFs with lower investment fund ownership. These findings suggest that investment funds can materially affect the primary ETF market, especially during times of stress.

Our findings highlight an important contagion channel from the open-ended fund sector to ETF markets. Because of these ownership linkages, stress in the open-ended fund sector can spill over to ETF markets. Specifically, our findings imply that outflows faced by open-ended funds are passed on to ETFs, which may result in widening spreads between ETF share prices and net asset values and net redemptions of ETF shares by authorized participants. In turn, this could ultimately impact the underlying assets that make up ETF redemption baskets and affect other market participants more broadly.

1 Introduction

The market for exchange-traded funds (ETFs) in the euro area has experienced significant growth in recent years. According to the ECB's Investment Funds Balance Sheet Statistics, the total net asset values of ETFs in the euro area has increased from EUR 347 billion in 2014-Q4 to EUR 1.5 trillion by 2023-Q4. Within the euro area, investment funds are the largest group of investors in ETFs (Figure 1a). Open-ended funds may invest in ETF shares for a variety of reasons. Besides the low-cost diversification opportunities provided by ETFs, open-ended funds may also use ETFs for liquidity management purposes (Grill et al., 2018; Sherrill et al., 2020). The intraday liquidity inherent to the ETF structure makes ETFs a viable alternative to cash and other liquid asset holdings for managing liquidity in a portfolio context, while providing higher expected returns. At the same time, ETFs generally have a low tracking error and allow for a closer alignment with a fund's portfolio benchmark.

Due to their large footprint in ETF markets, investment funds' trading activity might adversely impact the liquidity of ETFs. For instance, during the onset of the COVID-19 crisis, investment funds sold a large amount of ETF shares, especially when compared with other euro area investor sectors (Figure 1b). This period coincided with increased net redemptions from ETFs and a significant widening of the spread between ETF share price and its net asset value (European Central Bank, 2020). Such developments usually indicate a deterioration of liquidity in the underlying instruments which is of particular relevance for ETFs investing in relatively illiquid assets, such as corporate bonds (Dannhauser and Hoseinzade, 2022; Koont et al., 2022).

Given the unique properties of ETFs, this paper studies how open-ended funds use ETFs to manage liquidity in periods of stress and how their trading affects ETF markets. We first examine transactions in ETFs during the onset of the COVID-19 crisis by different investor sectors. Using data from the ECB's confidential Securities Holdings Statistics (SHS) database on quarterly ETF holdings by investor sector, we consider panel regressions in which we regress changes in holdings on a crisis dummy corresponding to 2020-Q1 interacted with investor sector dummies. Using a similar identification strategy as Allaire et al. (2023) and Fricke et al. (2022), we include ETF-times-quarter fixed effects that allow us to study selling behavior by different investor types within the same ETF within the same quarter. Second, using more granular data on open-ended funds from Refinitiv Lipper, we investigate the relation between fund-level redemptions and ETF sales during March 2020. This way, we test whether funds that were

subject to larger redemptions also sold a larger amount of their ETF holdings, which would be indicative of funds passing on their outflows to the ETFs they hold. Third, we study the relationship between ETFs' ownership composition and primary ETF flows during the COVID-19 crisis using data on daily ETF flows and returns from Refinitiv Lipper. This allows us to test the hypothesis that ETFs with larger ownership by investment funds were subject to larger net redemptions in the primary ETF market during March 2020.

Our main findings are as follows. First of all, we find that investment funds were the most run-prone investor type during the COVID-19 crisis. Specifically, we find that investment funds reduced their positions in equity (corporate bond) ETFs by an additional 22 (38) percentage points relative to the household sector during the first quarter of 2020 Q1. This is in line with recent findings by Allaire et al. (2023), who show that investment funds were also the largest net sellers of open-ended corporate bond funds during the COVID-19 pandemic. Second, we exploit heterogeneity across open-ended funds and show that those funds that faced larger outflows during March 2020 also scaled down their ETF holdings by a larger amount. Specifically, our tests reveal that a one percentage point increase in outflows during March 2020 implies a 1.4 percentage point additional reduction in ETF holdings. Moreover, for funds that invest in both ETFs as well as other mutual fund shares, we find that funds relied relatively more on ETF shares than on mutual fund shares when accommodating investor redemptions. This result is consistent with open-ended funds passing on the outflows they faced to the ETF shares they held. Third, we find that equity and corporate bond ETFs with higher lagged investment fund ownership faced significantly and substantially larger outflows during the COVID-19 market turmoil, after controlling for lagged ETF performance. Based on a multivariate panel regression model, we find that a one-standard deviation increase in investment fund ownership is associated with a decrease in daily flows of 7 to 17 basis points during the peak phase of the crisis. Overall, these results are consistent with open-ended funds using ETFs to manage their portfolio liquidity. By selling ETF shares in stressed markets, open-ended funds managed to preserve larger parts of their cash positions and holdings of other assets. At the same time, they were passing on the increased liquidity demand to the ETFs and ultimately to the liquidity providers in underlying securities markets.

Our paper contributes to several strands in the literature. First, we complement recent literature on cross-fund investments by specifically focusing on open-ended funds invested in ETFs (Fricke et al., 2022; Fricke and Wilke, 2023). These papers show that other mutual funds

are the most run-prone investors in open-ended fund shares, which is consistent with mutual funds passing on their outflows to the fund shares they hold. As such, these cross-fund holdings give rise to contagion effects within the investment fund sector. Our paper complements this literature by explicitly focusing on the link between open-ended funds and ETFs. The unique characteristics of ETFs could make them more attractive for liquidity management purposes than holdings in other mutual funds that cannot be traded intraday. Consistent with this, our results show that funds holding both ETFs as well as other mutual fund shares scaled down their ETF holdings to a larger extent than their holdings in mutual fund shares. Our results therefore highlight an important contagion channel from the open-ended fund sector to ETF markets.

Second, focusing on the use of ETFs for liquidity management, this paper also contributes to the broader literature on liquidity management by open-ended investment funds (Coval and Stafford, 2007; Lou, 2012; Chernenko and Sunderam, 2016; Choi et al., 2020; Jiang et al., 2021; Ma et al., 2022; Dekker et al., 2024). Our analysis is also closely related to the study by Sherrill et al. (2020) which shows that U.S. equity investment funds use ETFs to manage inflows and outflows. We contribute to this literature in three ways. First, we exploit the COVID-19 episode to analyse how open-ended funds used ETFs to manage liquidity in response to outflows during a period of significant market stress. Second, we also document the impact of fund ownership on ETF primary market flows during this crisis period. Third, we consider a broad sample of open-ended funds and ETFs covering the entire euro area. The sample includes mixed asset funds, which are the largest group of investment funds holding ETF shares, as well as their investments in bond and equity ETFs. In contrast, Sherrill et al. (2020) only consider equity mutual funds.

Finally, our paper also connects with the literature on the impact of ETF creations and redemptions on underlying asset markets (Brogaard et al., 2023; Dannhauser and Hoseinzade, 2022; Holden and Nam, 2017; Koont et al., 2022; Shim and Todorov, 2023). Shim and Todorov (2023) show that authorized participants (APs) can act as a buffer between ETFs and underlying asset markets during times of stress. Namely, when an AP receives the underlying assets in response to ETF share redemptions, the AP faces an incentive to keep these assets in inventory in order to avoid costly fire sales. Consequently, ETF share redemptions do not translate one-to-one in fire sales of the underlying assets. On the other hand, Koont et al. (2022) argue that inclusion in redemption baskets may in fact reduce the liquidity of the corresponding asset

during times of stress. Namely, when an AP receives assets following an ETF share redemption and keeps them in inventory, the AP may become reluctant to buy more of the same assets in secondary markets. This reduction in market making activity by APs may lead to a deterioration of secondary market liquidity of the corresponding assets. While the impact of ETF primary flows on underlying asset markets is beyond the scope of our paper, our analyses contribute to this literature by providing new insights in the main drivers of ETF primary flows.

The remainder of the paper is structured as follows. Section 2 describes our dataset and provides summary statistics. Section 3 studies differential selling behaviour by different investor types that invest in the same ETF. Section 4 examines the link between the magnitude of outflows faced by open-ended funds during March 2020 and the magnitude of ETF sales by the same open-ended funds. Section 5 studies the impact of the composition of ETFs' investor base and primary flows. Section 6 concludes.

2 Data description

2.1 ETF sample

We obtain daily flows and returns between January 2019 and June 2020 from Refinitiv Lipper for all equity and bond ETFs falling under the Undertakings for Collective Investment in Transferable Securities (UCITS) Directive. The UCITS Directive is a regulatory framework for investment funds in the European Union.[1] Table 1 shows the composition of our sample of ETFs. Overall, our sample includes 786 equity and 347 bond ETFs accounting for respectively 295 and 139 billion euros in total net assets by December 2019 (Panel A). The majority of our ETF sample is domiciled in Ireland and Luxembourg, both in terms of the number of ETFs as well as total net assets (Panel B). Panel C shows that most ETFs in our sample have a European investment universe. On top of this, a substantial number of ETFs has a global focus, focuses on emerging market assets, or on the United States. Finally, the category 'Other' primarily includes ETFs with a single-country focus other than the United States.

We merge these data with information on the ownership composition from the ECB Securities Holdings Statistics database. Since we only observe the investor type of euro area investors, we restrict the sample to ETFs for which at least 50% is owned by euro area investors. Table

[1] Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS).

2 shows the investor base of the ETFs in our sample. It follows for all three types of ETFs that investment funds are the largest owner on average. Other large investor sectors include households and foreign investors, for which we do not observe the specific investor sector. Hence, the ownership profile of the ETFs in our sample resembles the ownership profile of open-ended funds in the euro area (Allaire et al., 2023).

Figure 2 shows primary ETF flows during the COVID-19 episode, broken down by ETF type. Following Dekker et al. (2024), we define the crisis period as the period between February 24^{th}, 2020, and March 31^{st}, 2020. The World Health Organization officially declared COVID-19 as a global pandemic on March 11^{th}, 2020. We use this date to split the crisis period into an "Outbreak phase" (February 24^{th} – March 11^{th}) and a "Peak phase" (March 12^{th} – March 31^{st}). As shown in Figure 2, both equity as well as corporate bond ETFs experienced large net redemptions during this crisis episode, whereas sovereign bond ETFs faced net inflows.

Figure 3 shows the cumulative performance of ETFs as of February 1^{st}, 2020, broken down by ETF type. It follows that equity ETFs faced the largest losses, with aggregate cumulative returns reaching -30% during the peak of the COVID-19 crisis. Corporate bond and sovereign bond ETFs faced substantially milder losses, in line with findings for open-ended funds by Allaire et al. (2023). Still, despite the milder losses for corporate bond ETFs relative to equity ETFs, cumulative outflows during the same period were substantially larger for corporate bond ETFs.

2.2 Open-ended fund sample

We also obtain data for open-ended funds from Refinitiv Lipper. As we are interested in the use of ETFs to manage redemption requests, we first select all open-ended UCITS funds that held at least one ETF as of February 2020. Figure 4 shows that the resulting sample predominantly consists of mixed asset funds, followed by equity and bond funds. We discard any remaining open-ended funds with a different investment focus. Also, a substantial fraction of our sample consists of funds of funds (Figure 4).

Table 3 shows that most open-ended funds are domiciled in Luxembourg (Panel A). Moreover, the vast majority of these funds has a global investment focus, both in terms of total net assets as well as the number of funds (Panel B). Panel C shows a summary of the portfolio composition of the open-ended funds in our sample. Funds on average allocate 18.45% to ETFs, but there is large heterogeneity across funds. Apart from ETFs, funds on average allocate large fractions of their portfolios to other mutual fund shares, which intuitively makes sense given

that a substantial part of our sample consists of funds of funds.

3 ETF selling by different investor types

In this section, we study ETF transactions by different investor types in more detail. We restrict attention to equity ETFs and corporate bond ETFs. As shown by Figure 2, sovereign bond ETFs faced net inflows during March 2020 so they were not subject to large investor withdrawals, which is why we discard them from this analysis as we are mainly interested in run dynamics during the outbreak of the COVID-19 crisis. For each ETF in our remaining sample, we construct the quarterly percentage flow by each investor type using SHSS data (Fricke et al., 2022):

$$f_{i,q}^{j} = \frac{MV_{i,q}^{j} - MV_{i,q-1}^{j}(1+R_{i,q})}{MV_{i,q-1}^{j}(1+R_{i,q})} = \frac{MV_{i,q}^{j}}{MV_{i,q-1}^{j}(1+R_{i,q})} - 1 \tag{1}$$

Here, $f_{i,q}^{j}$ denotes the percentage flow of investor type j in ETF i during quarter q. Moreover, $MV_{i,q}^{j}$ denotes the market value of the aggregate position of investor type j in ETF i at the end of quarter q, and $R_{i,q}$ denotes the return of ETF i during quarter q. Because the denominator contains the lagged market value that investor type j held in ETF i, $f_{i,q}^{j}$ should be interpreted as the quarterly change in the aggregate position of investor type j. Figure 1a shows that investment funds, households, and the insurance company/pension fund sector are the largest holders of ETFs in the euro area. We therefore focus on these investor types and allocate the remaining investor types to a residual category labelled 'Other'. Finally, SHSS does not contain detailed information on holdings by investors outside the euro area. We compute the difference between each ETF's total net assets and the sum of all holdings by euro area investors from SHSS, and attribute this to holdings by investors outside the euro area. We label this group as 'Foreign'.

We then consider the following fixed-effects panel regression to compare the buying and selling of a given ETF share by different investor types:

$$log(1+f_{i,q}^{j}) = \sum_{k=1}^{K} \beta_k \times I(Sector_j = k) \times Crisis_q + \sum_{k=1}^{K} \gamma_k \times I(Sector_j = k) + \alpha_{i,q} + \varepsilon_{i,q,j} \tag{2}$$

Here, $I(Sector_j = k)$ is an indicator variable denoting the different investor sectors, where the household sector serves as the baseline. The variable $Crisis_q$ equals 1 in the first quarter

of 2020. Moreover, we include ETF × quarter fixed effects ($\alpha_{i,q}$) to absorb any time-varying ETF characteristics. This allows us to compare the differences in the buying and selling behavior across investor sectors within the same ETF within the same quarter. This identification strategy closely resembles Fricke et al. (2022), who study differential responses to the lagged performance of open-ended equity funds across different investor sectors, and Allaire et al. (2023), who study outflows from open-ended corporate bond funds by different investor sectors during the COVID-19 crisis.

Columns 1 and 2 in Table 4 contain the results based on a specification with just ETF fixed effects. Column 1 shows that during the first quarter of 2020, investment funds scaled down their positions in equity ETFs by an additional 23 percentage points compared with households. This effect is also statistically significant. We do not find a significant difference between the adjustments in ETF positions by insurance companies and pension funds, relative to households. However, the adjustment in ETF positions by the categories 'Other' and 'Foreign' are significantly larger than for households. Column 2 contains the results for corporate bond ETFs. The results are similar to those for equity ETFs, as we again find that the change in ETF holdings is significantly lower for investment funds relative to households during the first quarter of 2020. Specifically, investment funds on average scaled down their ETF holdings by an additional 38 percentage points compared with households. The coefficients on the interactions with the other investor sectors are statistically insignificant. Columns 3 and 4 contain the results based on a specification including ETF×Quarter fixed effects. The results from this specification are very close to the results in Columns 1 and 2. In summary, we find that for both equity as well as corporate bond ETFs, investment funds scaled down their pre-existing ETF positions relatively more than other investor sectors. This result is consistent with findings on run behaviour in open-ended equity funds by Fricke et al. (2022) and open-ended corporate bond funds by Allaire et al. (2023).

4 Flow-induced asset sales by open-ended funds

The results in Section 3 suggest that investment funds were the most run-prone investor types in the market for ETFs. One obvious explanation could be that these investment funds sold ETF shares in order to accommodate redemptions they faced themselves. In this section, we therefore study flow-induced asset sales by open-ended funds.

We first test whether open-ended funds that faced larger outflows during March 2020 also sold a larger part of their ETF holdings, relative to open-ended funds that faced smaller outflows. We consider the following regression, as in Ma et al. (2022):

$$Trade_{i,j} = \alpha_j + \beta Flow_i + \varepsilon_{i,j} \tag{3}$$

Here, the dependent variable is defined as $Trade_{i,j} = \frac{Shares_{i,j}^{March}}{Shares_{i,j}^{Feb}} - 1$, which is the percentage change in the number of shares of ETF j held by fund i during March 2020. Fund flows during March 2020 are defined as follows:

$$Flow_i = \frac{TNA_{i,t} - TNA_{i,t-1} \times (1 + R_{i,t})}{TNA_{i,t-1}} \tag{4}$$

Here, $TNA_{i,t}$ denotes the fund's Total Net Assets at the end of month t, and $R_{i,t}$ is the fund's return during month t. The inclusion of ETF fixed effects (α_j) implies that we compare differential selling behaviour across open-ended funds within the same ETF. By doing so, we implicitly control for ETF characteristics that may be related to funds' selling behaviour. This addresses potential endogeneity concerns, as ETF characteristics (such as its geographical investment focus) may be correlated with the magnitude of outflows faced by open-ended funds as well as their corresponding selling decision. As this identification strategy requires at least two open-ended funds holding a given ETF, we drop ETFs that are held by only one open-ended fund.

Table 5 contains the results. In column 1, we consider all types of ETFs in our sample. It follows that within a given ETF, funds that were subject to larger outflows in March 2020 also sold a significantly larger fraction of their position in this ETF. Specifically, a one percentage point increase in outflows is associated with an additional decrease in ETF holdings by 1.4 percentage points. In Columns 2-4, we separately consider equity, corporate bond, and sovereign bond ETFs, respectively. Our results continue to hold within each subset of ETFs, although the economic magnitude appears somewhat larger for equity ETFs compared with bond ETFs.

Fund managers can employ various liquidity management strategies when accommodating flows. For instance, fund managers can horizontally slice their portfolios in response to outflows, meaning that they sell their most liquid assets first in order to minimize portfolio rebalancing costs. Alternatively, fund managers can also choose to vertically slice their portfolios, meaning that they sell assets in proportion to their portfolio weights to preserve the fund's portfolio

composition. Since both strategies would predict that larger outflows would be associated with larger ETF sales, the results in Table 5 do not directly allow us to make a clear distinction between these different liquidity management strategies. Next, we therefore test whether in response to outflows, fund managers liquidated a larger fraction of their ETF holdings relative to their holdings in other asset types. If so, this would suggest that fund managers use ETFs to manage portfolio liquidity.

We therefore consider the following regression:

$$Trade_{i,j} = \alpha_i + \beta Flow_i + \gamma' \left(Flow_i \times Type_i\right) + \delta' Type_i + \varepsilon_{i,j} \tag{5}$$

Here, the dependent variable is again defined as $Trade_{i,j} = \frac{Shares_{i,j}^{March}}{Shares_{i,j}^{Feb}} - 1$, which is the percentage change in the number of shares of security j held by fund i at the end of month t. In case security j represents a bond, we consider the percentage change in the par value held. This way, our dependent variable is not confounded by valuation changes. The variable $Type_j$ is a categorical variable indicating the type of security j. The inclusion of fund fixed effects (α_i) implies that we compare differential selling behaviour across asset types within a given open-ended fund.

We first test whether funds disproportionally sold ETF shares relative to other mutual fund shares, which represent the largest portfolio component of the open-ended funds in our sample (see Figure 4). Note that some funds may avoid mutual fund shares altogether and invest in ETFs instead. In such a scenario, where mutual fund holdings are substituted by holdings in ETFs, it is not possible to test whether funds disproportionally sold ETF shares relative to mutual fund shares. We therefore restrict attention to funds holding both mutual fund shares as well as ETF shares. The resulting subsample includes 1,209 open-ended funds that hold both mutual fund shares as well as ETFs. Panel A of Table 6 contains the result of estimating Equation (5) in which attention is restricted to observations where $Type_j$ corresponds to mutual fund shares and ETFs, where mutual fund shares serve as the baseline. Funds may have many positions with tiny portfolio weights. Consequently, small absolute changes in these portfolio holdings may lead to extreme percentage changes. We therefore consider a weighted least-squares approach in Columns 2 and 5, where the weight of each observation is determined by the portfolio weight that fund i held in security j at the end of February 2020. In Columns 3 and 6, we focus on a subsample where we restrict the sample to observations where the pre-existing portfolio weight

exceeds 0.5%.

It follows from Columns 1-3 in Table 6, in which fund fixed effects are excluded, that open-ended funds also pass on their outflows to other mutual funds as the coefficient on standalone flows is significantly positive. This result is in line with recent findings by Fricke et al. (2022), Allaire et al. (2023), and Fricke and Wilke (2023). Moreover, it also follows that on average, ETF sales were significantly larger than sales of mutual fund shares, as indicated by the standalone coefficient on $Type_j$. For instance, the result in Column 3 shows that funds scaled down their ETF holdings by 5.64 additional percentage points relative to other mutual fund shares, all else equal. Moreover, the coefficients on the interaction between fund flows and $Type_j$ suggest that in response to an increase in outflows during March 2020, funds scaled down their ETF holdings by more than their holdings in mutual fund shares. Overall, these results suggest that funds relied relatively more on ETF shares than on mutual fund shares when accommodating outflows during March 2020.

We next examine sales of equity ETFs relative to sales of direct equity holdings. We therefore restrict attention to funds holding both equities as well as equity ETF shares. The resulting subsample includes 518 open-ended funds. Panel B of Table 6 contains the result of estimating Equation (5) in which attention is restricted to observations where $Type_j$ corresponds to equities and equity ETFs, where equities serve as the baseline. It follows from Columns 1-3, in which fund fixed effects are excluded, that open-ended funds also pass on their outflows to the equity market as the coefficient on standalone flows is significantly positive, which is in accordance with Coval and Stafford (2007) and Lou (2012). Moreover, we do not detect a significant difference between sales of equity ETFs versus sales of equities based on the standalone coefficient on $Type_j$. However, the coefficients on the interaction between fund flows and $Type_j$ suggest that in response to an increase in outflows during March 2020, funds scaled down their equity ETF holdings by more than their direct equity holdings. These results suggest that funds relied relatively more on equity ETF shares than direct equity holdings when accommodating outflows during March 2020.

We finally compare sales in corporate bond ETFs versus sales of direct corporate bond holdings in Panel C of Table 6. Some corporate bonds matured in March 2020, and hence changes in funds' holdings of these bonds equal -100%. We therefore exclude observations corresponding to bonds that matured in March 2020 as these do not reflect active selling decisions. Given the relative illiquidity of corporate bonds, corporate bond ETFs may be a particularly appealing

instrument to manage fund flows. Nevertheless, our sample contains relatively few funds (only 116) that simultaneously invest in both corporate bonds as well as in corporate bond ETFs. The results in Panel C do not provide evidence that funds relied more on corporate bond ETFs than on direct corporate bond holdings when meeting outflows.

Concluding, we find that funds passed on their outflows to various asset types, and in some cases this effect is more pronounced for ETFs. While reaching conclusive evidence on the exact ranking of ETFs in funds' pecking order of liquidation is challenging, our results imply that large aggregate outflows from open-ended funds can lead to material spill-over effects to the ETF market.

5 Impact of investment funds on ETF markets

In this section, we study primary flows in the ETF market in relation to the ownership composition of ETFs. The results in Section 3 and 4 showed that outflows from open-ended funds were passed on to ETFs during March 2020. This may have a material impact on primary ETF flows given the large ownership stake of investment funds in the ETF market. To assess the impact of higher ex-ante investment fund ownership on ETFs' flows during stress periods, we separately run the following panel regression for a sample of equity ETFs and a sample of corporate bond ETFs:

$$\begin{aligned} f_{i,q,t} = \alpha_t + \delta_i + \gamma \left(\min\left(0, r_{i,q,t-1}\right) \times Crisis_t\right) + \delta \left(\max\left(0, r_{i,q,t-1}\right) \times Crisis_t\right) \\ + \lambda \min\left(0, r_{i,q,t-1}\right) + \mu \max\left(0, r_{i,q,t-1}\right) + \theta \left(IFOwnership_{i,q-1} \times Crisis_t\right) \\ + \phi IFOwnership_{i,q-1} + \sum_{z=1}^{5} \rho_z f_{i,q,t-z} + \varepsilon_{i,q,t} \end{aligned} \tag{6}$$

The dependent variable $f_{i,q,t}$ denotes the daily primary flow of ETF i on day t in quarter q. The variable $Crisis_t$ is a dummy corresponding to the COVID-19 crisis phase (February 24^{th} – March 31^{st}). Moreover, $IFOwnership_{i,q-1}$ denotes the fraction of ETF i that is held by euro area investment funds. As mentioned in Section 2, we restrict the sample to ETFs owned for at least 50% by euro area investors, as we only observe the type of investor for euro area investors. α_t and δ_i denote time and ETF fixed effects, respectively. Finally, $r_{i,q,t-1}$ denotes the daily, weekly, or monthly lagged return of ETF i ending at the end of day $t-1$. Controlling for lagged fund performance is important, as it is a key driver of fund flows (see, e.g., Berk and Green,

2004). Dannhauser and Pontiff (2021) show that the flow-performance sensitivity for equity ETFs is larger than for open-ended equity funds. They argue that lagged ETF performance may lead investors to update their expectations about future benchmark returns. Controlling for lagged performance is therefore crucial when examining the magnitude of flow-induced ETF selling by investment funds. In doing so, we aim to alleviate the concern that outflows from ETFs are driven by changing expectations or deteriorating fundamentals, to the extent this is reflected in lagged ETF performance.

Table 7 contains the results based on the regression specification in Equation (6). We are mainly interested in the interactions between the crisis dummy and lagged investment fund ownership.

For both equity ETFs (Columns 1-3) as well as corporate bond ETFs (Columns 4-6), we find a significant negative coefficient on the interaction between lagged investment fund ownership and the crisis dummy, irrespective of the horizon over which we measure lagged returns. This indicates that after controlling for lagged fund performance, ETFs in which investment funds had a larger ownership stake as of December 2019 faced significantly larger outflows during the COVID-19 episode. These effects are also economically significant. Regarding equity ETFs, the results in Column 3 show that a one-standard deviation increase in investment fund ownership is associated with additional outflows of 4.5 basis points per day (25.4 $\times$ -0.177). The results do not change much in case we measure lagged returns over daily or weekly horizons (Columns 1 and 2, respectively). Regarding corporate bond ETFs, the results in Column 6 show that a one-standard deviation increase in investment fund ownership imply additional outflows of 13 basis points per day (25.3 $\times$ -0.515). Again, the horizon over which lagged returns are measured barely impacts our results, as the economic magnitude is fairly similar in Columns 4-6.

We next split the crisis period in an Outbreak phase (February 24^{th} – March 11^{th}) and a Peak phase (March 12^{th} – March 31^{st}). Table 8 contains the results. Here, we find that ETFs with larger ownership by investment funds faced significantly larger outflows during the Peak phase of the COVID-19 crisis relative to ETFs primarily held by other types of investors. During the Outbreak phase however, we do not find a significant relationship between lagged investment fund ownership and primary flows. This finding holds, regardless of the horizon at which we measure lagged returns, for both equity and corporate bond ETFs. Based on the results in Column 3, an increase in investment fund ownership in equity ETFs by one standard deviation (25.4 percentage points) implies an increase in daily outflows by 7 basis points during

the peak phase, whereas average aggregate daily outflows during the peak phase were equal to 12 basis points. For corporate bond ETFs, a one-standard deviation increase in investment fund ownership (25.3 percentage points) is associated with an increase in daily outflows of 17 basis points based on Column 6, relative to average aggregate daily outflows of 38 basis points during the peak phase. The result that the impact of investment fund ownership on primary flows in the ETF market is concentrated in the peak phase of the COVID-19 crisis is consistent with the notion that open-ended funds faced the largest outflows themselves during the Peak phase (Dekker et al., 2024). Overall, our results are consistent with Dannhauser and Pontiff (2021), who argue that institutional investors are key drivers of ETF primary flows.

6 Conclusion

Investment funds are the largest group of ETF investors in the euro area. Our results from fixed-effects panel regressions in which we compare the behavior from different investor types within the same ETF within the same quarter show that investment funds were the most run-prone investor type during the COVID-19 crisis. We then show that ETF selling by open-ended funds during March 2020 was stronger for funds facing larger outflows. This result is most pronounced for sales of equity ETFs, but funds passed on their outflows to other types of ETFs as well. This finding is consistent with funds using ETFs for managing liquidity and raising cash if needed. Finally, we also find that a larger share of fund ownership in ETFs translates into more sizable redemptions in the primary market for equity and corporate bond ETFs during the COVID-19 episode.

Selling ETF shares in stressed markets allowed open-ended funds to preserve larger cash positions and holdings of other assets. At the same time, they were passing-on the increased liquidity demand to the ETFs and ultimately to the liquidity providers in underlying securities markets. The results are consistent with open-ended funds passing on part of their outflows (the 'hot potato') to the ETFs that they are invested in. As such, our findings highlight an important contagion channel from the open-ended fund sector to ETF markets.

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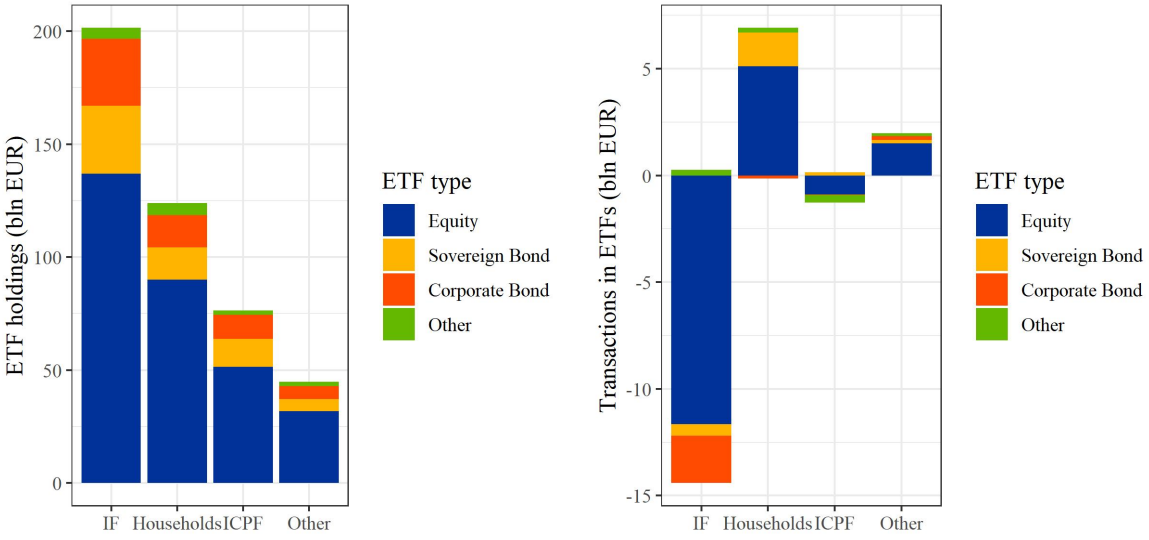
Figures

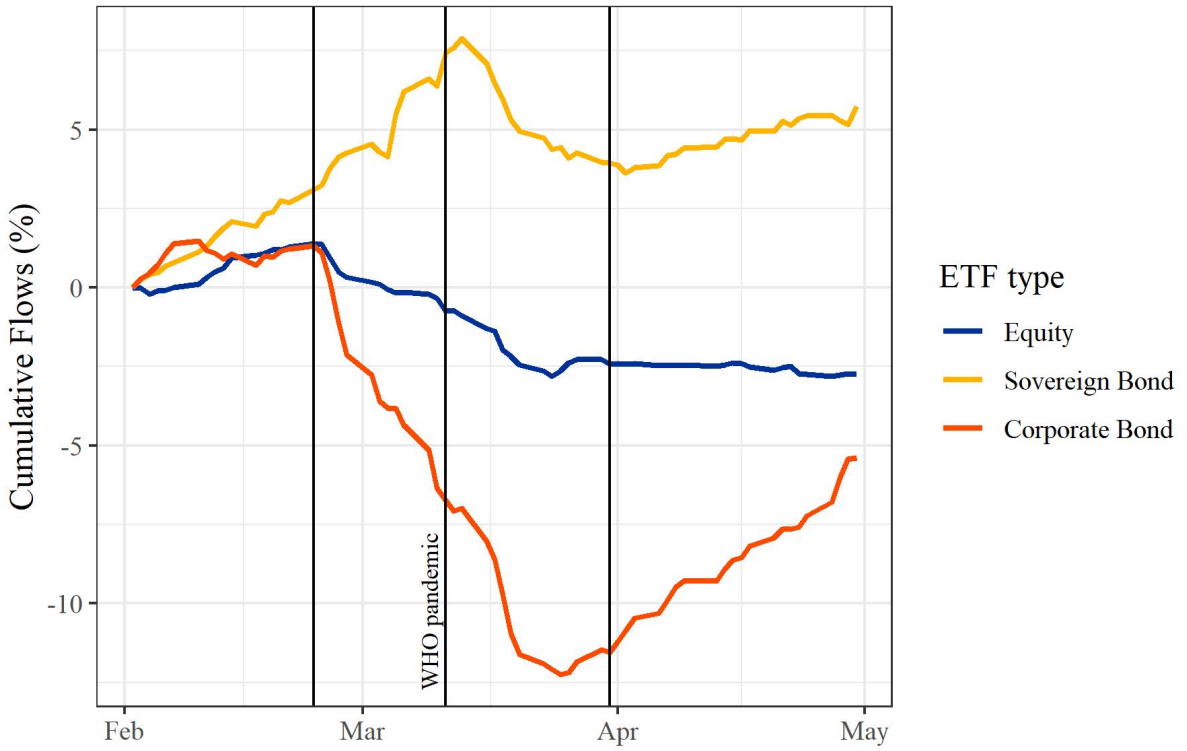
Figure 1: Ownership and transactions in ETFs during 2020-Q1.



(a) ETF ownership as of 2019-Q4. **(b)** Transactions in ETFs during 2020-Q1.

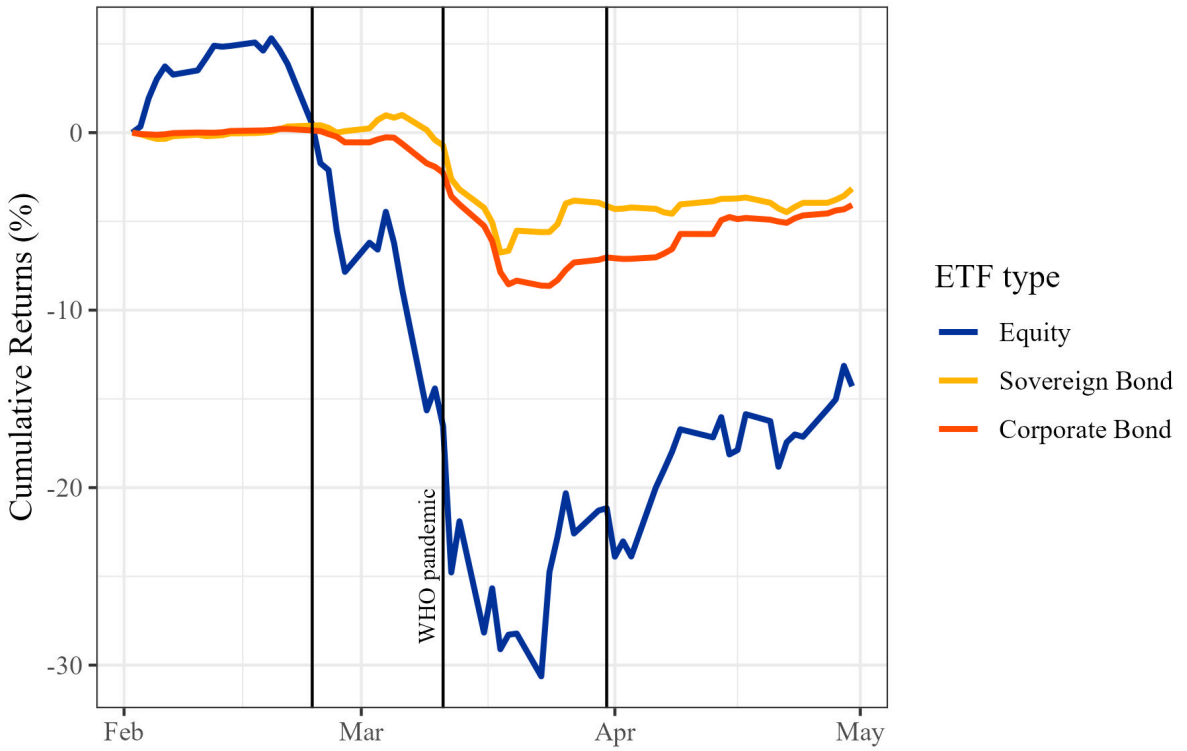
Notes: Panel A shows the value of ETFs held by euro area investors as of December 2019, broken down by investor type and ETF type. The sample of ETFs consists of ETFs belonging to the Undertaking for Collective Investment in Transferable Securities (UCITS) framework. We distinguish between investment funds (IF), households, insurance companies and pension funds (ICPF), and the remaining investor types are classified as 'Other'. Panel B shows the net transactions by euro area investors during the first quarter of 2020, broken down by investor type and ETF type. Source: Refinitiv Lipper, Securities Holdings Statistics.

Figure 2: Primary ETF flows during 2020-Q1.



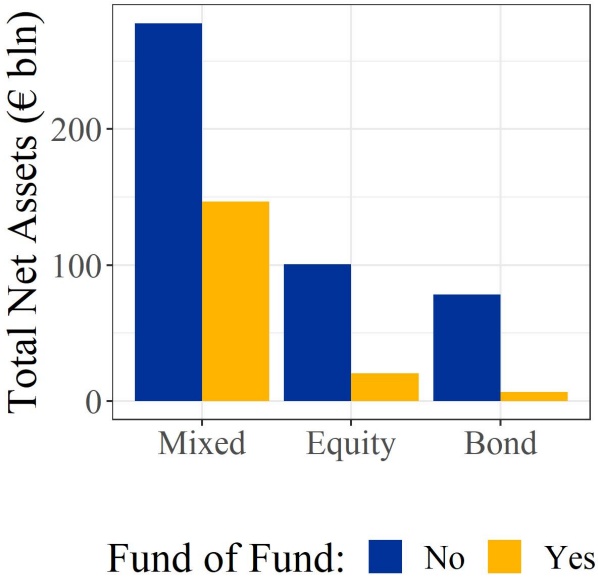
Notes: This figure shows cumulative primary flows for all UCITS ETFs, broken down by ETF type. The starting date is February 1^{st}, 2020. The vertical lines correspond to February 24^{th}, March 11^{th}, and March 31^{st}, respectively. Source: Refinitiv Lipper.

Figure 3: ETF performance during 2020-Q1.



Notes: This figure shows aggregate cumulative returns for all UCITS ETFs, broken down by ETF type. The starting date is February 1^{st}, 2020. The vertical lines correspond to February 24^{th}, March 11^{th}, and March 31^{st}, respectively. Source: Refinitiv Lipper.

Figure 4: Summary of open-ended funds investing in ETFs as of 2019-Q4.



Notes: This figure shows the total net assets of open-ended funds holding ETFs, broken down by investment focus (mixed funds, equity funds, or bond funds). We also distinguish between funds of funds and regular mutual funds. Source: Refinitiv Lipper.

Tables

Table 1: Summary ETF sample.

Panel A. Asset Type					
	Equity	Bond Corporate	Bond Sovereign	Bond Other	
Number of funds	786	117	199	31	
TNA (EUR bln)	295	70	66	3	
Panel B. Domicile					
	France	Germany	Ireland	Luxembourg	Other
Number of funds	73	97	427	531	7
TNA (EUR bln)	29	45	203	157	0
Panel C. Geographical Focus					
	Europe	Global	Emerging Markets	US	Other
Number of funds	389	216	67	187	276
TNA (EUR bln)	177	69	35	82	71

Notes: This table provides a summary of our sample of ETFs. This sample covers equity and bond ETFs that are regulated under the Undertaking for Collective Investment in Transferable Securities (UCITS) framework. Panel A shows the number of ETFs as well as aggregate Total Net Assets (TNA) broken down by the asset class to which the ETF allocates. Panel B shows the number of ETFs as well as aggregate TNA broken down by ETFs' country of domicile. Finally, Panel C shows the number of ETFs as well as aggregate TNA broken down by ETFs' geographical investment focus.

Table 2: Ownership profile of ETFs.

ETF type	Equity		Corporate Bond		Sovereign Bond	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Foreign	21.22	15.55	22.25	14.97	18.92	13.99
Households	27.79	23.79	21.42	19.47	21.18	19.04
ICPF	7.5	13.24	8.29	9.56	11.87	15.53
IF	28.77	25.55	31	25.28	30.78	24.98
Other	14.72	20.85	17.04	24.17	17.25	24

Notes: This table summarizes the composition of the investor base of the ETFs in our sample, while distinguishing between ETF types (equity ETFs, corporate bond ETFs, and sovereign bond ETFs). We consider the following investor types: households, insurance companies and pension funds (ICPF), investment funds (IF), other euro area investors (Other), and non-euro area investors (Foreign).

Table 3: Summary OEF sample (based on 2029 funds).

Panel A. Domicile							
	France	Germany	Ireland	Luxembourg	Sweden	UK	Other
Number of funds	148	173	100	813	59	280	456
TNA (EUR bln)	28	22	44	290	50	119	78
Panel B. Geographical Focus							
				Emerging			
		Europe	Global	Markets	UK	US	Other
Number of funds		154	1690	45	42	27	71
TNA (EUR bln)		46	513	20	27	6	18
Panel C. Portfolio composition							
Asset Type			Mean	St. Dev.	5%	50%	95%
Cash			3.63	7.15	-0.13	1.16	14.61
Corporate Bond			9.33	18.71	0	0	53.04
ETF			18.45	23.19	0.55	8.9	79.11
Equity			20.36	30.76	0	0	93.52
Mutual Funds			36.98	33.95	0	28.09	92.27
Other			1.74	6.72	-0.91	0	9.81
Sovereign Bond			7.76	15.32	0	0	38.94

Notes: This table provides a summary of our sample of open-ended funds. Panel A shows the number of ETFs as well as aggregate Total Net Assets (TNA) broken down by funds' country of domicile. Panel B shows the number of open-ended funds as well as aggregate TNA broken down by geographical investment focus. Finally, Panel C summarizes the portfolio compositions of the open-ended funds in our sample.

Table 4: ETF trading by different investor sectors.

ETF type:	Equity	Corporate Bond	Equity	Corporate Bond
Model:	(1)	(2)	(3)	(4)
Crisis	0.004	-0.047		
	(0.223)	(-0.796)		
Investment Funds	-0.089**	-0.035	-0.087**	-0.035
	(-6.07)	(-0.839)	(-6.02)	(-0.832)
ICPF	-0.049**	0.028	-0.047**	0.038
	(-3.28)	(0.482)	(-3.14)	(0.670)
Foreign	-0.024	-0.002	-0.023	-0.001
	(-1.87)	(-0.070)	(-1.78)	(-0.031)
Other	-0.103**	-0.088	-0.104**	-0.079
	(-6.92)	(-1.85)	(-6.91)	(-1.65)
Crisis × Investment Funds	-0.226**	-0.379**	-0.220**	-0.378**
	(-5.85)	(-3.63)	(-5.58)	(-3.59)
Crisis × ICPF	-0.039	-0.177	-0.030	-0.192
	(-1.14)	(-1.79)	(-0.866)	(-1.91)
Crisis × Foreign	0.092**	0.053	0.093**	0.044
	(2.97)	(0.518)	(2.98)	(0.420)
Crisis × Other	0.197**	0.023	0.202**	0.001
	(4.73)	(0.212)	(4.83)	(0.012)
ETF FE	Yes	Yes	No	No
ETF×Quarter FE	No	No	Yes	Yes
Observations	14,120	1,775	14,120	1,775
# ETFs	745	105	745	105
Adjusted R^2	0.039	0.051	0.046	0.050

Notes: This table contains the results of regressing changes in log positions in a given ETF by different investor sectors on a crisis dummy interacted with investor sector dummies. The unit of observation is on the ETF-investor sector-quarter level. The regression specification includes ETF fixed effects that absorb time-invariant ETF characteristics in Columns 1 and 2, and ETF×Quarter fixed effects in Columns 3 and 4 that absorb time-varying ETF characteristics. In Columns 1 and 3, we restrict attention to equity ETFs, whereas Columns 2 and 4 contain the results for corporate bond ETFs. Standard errors are clustered at the ETF-level, and the resulting t-statistics are shown in brackets. * p<0.05; ** p<0.01.

Table 5: ETF sales by open-ended funds in response to outflows during March 2020.

ETF Type	All	Equity	Corp. Bond	Sov. Bond
Model:	(1)	(2)	(3)	(4)
Flow	1.39**	1.48**	1.20**	1.17**
	(6.97)	(5.94)	(2.80)	(2.67)
ETF FE	Yes	Yes	Yes	Yes
Observations	6,441	4,179	731	1,011
Adjusted R^2	0.172	0.175	0.119	0.172

Notes: This table shows the results of regressing changes in open-ended funds' ETF holdings in March 2020 on flows faced by open-ended funds in March 2020. Specifically, the dependent variable, $Trade_{i,j}$, denotes the percentage change in the number of shares of ETF j held by fund i during March 2020. Moreover, we also include ETF fixed effects. T-statistics are shown in brackets. * p<0.05; ** p<0.01.

Table 6: Selling of ETFs relative to other portfolio assets.

Panel A. Mutual fund shares versus ETFs						
Sample:	Full	Full	Weight $> 0.5\%$	Full	Full	Weight $> 0.5\%$
Model:	OLS	WLS	OLS	OLS	WLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-7.37**	-7.36**	-7.79**			
	(-9.12)	(-10.9)	(-9.57)			
Flow	0.962**	1.14**	1.17**			
	(7.25)	(9.14)	(7.62)			
$Type_j$ = ETF	-4.92**	-6.85**	-5.64**	-3.65**	-2.51*	-3.43**
	(-3.88)	(-4.81)	(-4.46)	(-3.26)	(-2.20)	(-3.15)
Flow × $Type_j$ = ETF	0.758**	0.254	0.455*	0.909**	0.506*	0.646**
	(3.54)	(1.03)	(2.10)	(3.99)	(2.28)	(2.91)
Fund FE	No	No	No	Yes	Yes	Yes
Observations	21,640	21,640	18,425	21,640	21,640	18,425
# Funds	1,209	1,209	1,076	1,209	1,209	1,076
Adjusted R^2	0.022	0.032	0.027	0.172	0.232	0.200
Panel B. Equity versus Equity ETFs						
Constant	-3.45**	-4.65**	-4.57**			
	(-3.39)	(-5.27)	(-4.34)			
Flow	1.21**	1.08**	1.16**			
	(7.54)	(7.90)	(6.50)			
$Type_j$ = Equity ETF	-2.20	-0.272	-2.40	0.148	-0.033	-3.44
	(-1.05)	(-0.131)	(-1.21)	(0.069)	(-0.015)	(-1.48)
Flow × $Type_j$ = Equity ETF	0.954*	0.978*	1.02*	0.992*	1.24*	0.978*
	(2.27)	(2.30)	(2.25)	(2.17)	(2.56)	(2.00)
Fund FE	No	No	No	Yes	Yes	Yes
Observations	69,857	69,857	11,407	69,857	69,857	11,407
# Funds	518	518	398	518	518	398
Adjusted R^2	0.018	0.026	0.026	0.150	0.189	0.183
Panel C. Corporate bonds versus Corporate Bond ETFs						
Constant	-12.0	-14.7**	-15.9			
	(-1.48)	(-2.69)	(-1.71)			
Flow	0.730	0.649	0.395			
	(1.16)	(1.68)	(0.565)			
$Type_j$ = Corporate Bond ETF	-3.92	-3.29	0.821	-3.16	-2.56	5.11
	(-0.366)	(-0.392)	(0.056)	(-0.297)	(-0.183)	(0.309)
Flow × $Type_j$ = Corporate Bond ETF	1.32	-0.144	1.18	1.49	0.171	1.20
	(1.18)	(-0.123)	(0.719)	(1.29)	(0.099)	(0.636)
Fund FE	No	No	No	Yes	Yes	Yes
Observations	942	942	335	942	942	335
# Funds	116	116	69	116	116	69
Adjusted R^2	0.012	0.001	-0.003	0.285	0.195	0.140

Notes: This table presents the results of regressing changes in open-ended funds' portfolio holdings in March 2020 on flows faced by open-ended funds in March 2020, interacted with a dummy variable that indicates the asset class of the corresponding portfolio holding. Specifically, the dependent variable, $Trade_{i,j}$, denotes the percentage change in the number of shares of ETF j held by fund i during March 2020. Moreover, we also include fund fixed effects. In Panel A, we restrict attention to funds that simultaneously hold ETF shares as well as mutual fund shares. In Panel B, we restrict attention to funds that simultaneously invest in equities as well as equity ETFs. Finally, in Panel C, we restrict attention to funds that simultaneously invest in corporate bonds as well as corporate bond ETFs. T-statistics are shown in brackets. * p<0.05; ** p<0.01.

Table 7: Investment fund ownership and primary ETF flows.

Dependent variable:	Equity ETF flows			Corporate Bond ETF flows		
Lagged returns:	Daily	Weekly	Monthly	Daily	Weekly	Monthly
Model:	(1)	(2)	(3)	(4)	(5)	(6)
IF Ownership	-0.156**	-0.157**	-0.176**	0.092	0.089	0.093
	(-4.09)	(-4.11)	(-4.49)	(0.868)	(0.835)	(0.840)
IF Ownership × Crisis	-0.175**	-0.179**	-0.177*	-0.515*	-0.507*	-0.515*
	(-2.61)	(-2.62)	(-2.57)	(-2.17)	(-2.13)	(-2.16)
$r^i_{t-1}\| < 0$	0.453	1.24**	0.852**	-13.7	0.713	-0.439
	(0.747)	(3.11)	(3.09)	(-1.43)	(0.215)	(-0.405)
$r^i_{t-1}\| < 0 \times$ Crisis	1.29	-1.58*	-1.66**	27.7	0.525	0.297
	(1.24)	(-2.20)	(-3.92)	(1.81)	(0.110)	(0.151)
$r^i_{t-1}\| > 0$	1.14	2.24**	1.21**	7.61	2.72	2.94**
	(1.86)	(5.49)	(5.99)	(1.02)	(1.33)	(2.88)
$r^i_{t-1}\| > 0 \times$ Crisis	-1.58	-1.45	-0.462	7.00	-3.29	22.1**
	(-0.958)	(-1.87)	(-0.157)	(0.392)	(-0.838)	(2.74)
ETF FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lagged flows	Yes	Yes	Yes	Yes	Yes	Yes
Observations	268,878	267,228	254,151	39,720	39,575	38,130
Adjusted R^2	0.021	0.021	0.021	0.018	0.017	0.018

Notes: This table shows the results of regressing daily primary ETF flows on lagged returns and lagged investment fund ownership, as well as their interactions with crisis dummies, using shareclass-day observations during the sample period between January 2019 and May 2020. The first crisis dummy (*Outbreak*) corresponds to the the period February 24^{th} and March 11^{th}, 2020. The second crisis dummy (*Peak*) corresponds to the the period March 12^{th} and March 31^{st}, 2020. In Columns 1-3, the sample consists of equity ETFs, whereas in Columns 4-6, the sample consists of corporate bond ETFs. In columns 1 and 4, lagged returns are measured on a daily horizon. In columns 2 and 5, lagged returns are measured over a weekly horizon. Finally, in columns 3 and 6, lagged returns are measured over a monthly horizon. Standard errors are clustered at the shareclass and day levels, and t-statistics are shown in parentheses. * p<0.05; ** p<0.01.

Table 8: Investment fund ownership and primary ETF flows.

Dependent variable:	Equity ETF flows			Corporate Bond ETF flows		
Lagged returns:	Daily	Weekly	Monthly	Daily	Weekly	Monthly
Model:	(1)	(2)	(3)	(4)	(5)	(6)
IF Ownership	-0.156**	-0.156**	-0.176**	0.095	0.099	0.096
	(-4.09)	(-4.11)	(-4.49)	(0.890)	(0.933)	(0.866)
IF Ownership × Outbreak	-0.063	-0.062	-0.060	-0.323	-0.326	-0.345
	(-0.797)	(-0.782)	(-0.748)	(-1.15)	(-1.14)	(-1.19)
IF Ownership × Peak	-0.282**	-0.288**	-0.285**	-0.689*	-0.688*	-0.692*
	(-3.02)	(-2.98)	(-2.94)	(-2.56)	(-2.55)	(-2.57)
$r^i_{t-1}\| < 0$	0.447	1.23**	0.854**	-13.8	0.983	-0.226
	(0.737)	(3.10)	(3.09)	(-1.44)	(0.295)	(-0.210)
$r^i_{t-1}\| < 0$ × Outbreak	-1.35	-1.68	-1.29	72.6**	33.9**	23.7**
	(-0.634)	(-1.38)	(-1.24)	(4.05)	(4.02)	(3.53)
$r^i_{t-1}\| < 0$ × Peak	2.18*	-1.60*	-1.74**	16.5	-2.05	-0.673
	(2.23)	(-1.97)	(-4.00)	(1.14)	(-0.442)	(-0.370)
$r^i_{t-1}\| > 0$	1.15	2.25**	1.21**	7.65	2.48	2.77**
	(1.87)	(5.51)	(5.99)	(1.03)	(1.20)	(2.73)
$r^i_{t-1}\| > 0$ × Outbreak	0.530	5.35**	-0.719	51.4	19.8	12.1
	(0.189)	(3.01)	(-0.239)	(0.743)	(1.10)	(1.54)
$r^i_{t-1}\| > 0$ × Peak	-2.07	-1.74*	7.05*	3.14	-4.47	33.7*
	(-1.16)	(-2.27)	(2.11)	(0.192)	(-1.19)	(2.50)
ETF FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Lagged flows	Yes	Yes	Yes	Yes	Yes	Yes
Observations	268,878	267,228	254,151	39,720	39,575	38,130
Adjusted R^2	0.021	0.021	0.021	0.019	0.018	0.019

Notes: This table shows the results of regressing daily primary ETF flows on lagged returns and lagged investment fund ownership, as well as their interactions with crisis dummies, using shareclass-day observations during the sample period between January 2019 and May 2020. The first crisis dummy (*Outbreak*) corresponds to the the period February 24^{th} and March 11^{th}, 2020. The second crisis dummy (*Peak*) corresponds to the the period March 12^{th} and March 31^{st}, 2020. In Columns 1-3, the sample consists of equity ETFs, whereas in Columns 4-6, the sample consists of corporate bond ETFs. In columns 1 and 4, lagged returns are measured on a daily horizon. In columns 2 and 5, lagged returns are measured over a weekly horizon. Finally, in columns 3 and 6, lagged returns are measured over a monthly horizon. Standard errors are clustered at the shareclass and day levels, and t-statistics are shown in parentheses. * p<0.05; ** p<0.01.

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