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Liquidity management and asset sales by bond funds
in the face of investor redemptions in March 2020

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Liquidity management and asset sales by bond funds in the face of investor redemptions in March 2020

Key takeaways

- *Investor redemptions are one factor behind asset sales by open-ended mutual funds, but an important additional factor is the selling due to the funds' liquidity management.*
- *Funds holding illiquid assets reacted to redemptions in March 2020 by adding to their cash buffers even after meeting investor redemptions. For such funds, asset sales exceeded investor redemptions.*
- *Increases in end-of-period cash holdings were less pronounced for funds that started the stress period with larger buffers, suggesting that such funds were less prone to selling at the height of the stress.*

Asset sales by open-ended mutual funds are often discussed exclusively in terms of investor redemptions. However, asset sales due to liquidity management decisions by fund managers are an important additional aspect. This Bulletin examines how bond mutual funds' portfolio adjustments due to liquidity management added to the system-wide "dash for cash" in March 2020.

Some funds drew down their cash buffers to meet investor redemptions. However, the majority of bond funds that faced redemptions responded by selling more of the underlying assets than was strictly necessary to meet those redemptions. As a result, these funds ended March 2020 with higher levels of cash than at the beginning of the month, instead of drawing down their cash buffers. Our findings corroborate earlier studies that cast doubt on the "pecking order" theory of liquidity management – namely, that funds draw on cash balances first and sell assets only as a last resort. Instead, the preservation of cash appears to have been given higher priority, so that funds sold illiquid assets ahead of drawing down cash balances.¹

Our findings point to an important role of the liquidity characteristics of the underlying assets as well as precautionary buffers as key factors in explaining the degree to which bond funds increased cash holdings in the face of redemptions. Bond funds investing in emerging market economy (EME) government bonds were most prone to selling due to such liquidity management practices. Among advanced economy (AE) bond funds, the end-of-period cash balances were higher in US corporate bond funds, as well as in funds investing in European sovereign bonds. Perhaps surprisingly, we find that funds that invest in US government securities also exhibited such "cash hoarding". Another noteworthy finding is that funds that started the stress period with higher cash buffers were less likely to engage in cash

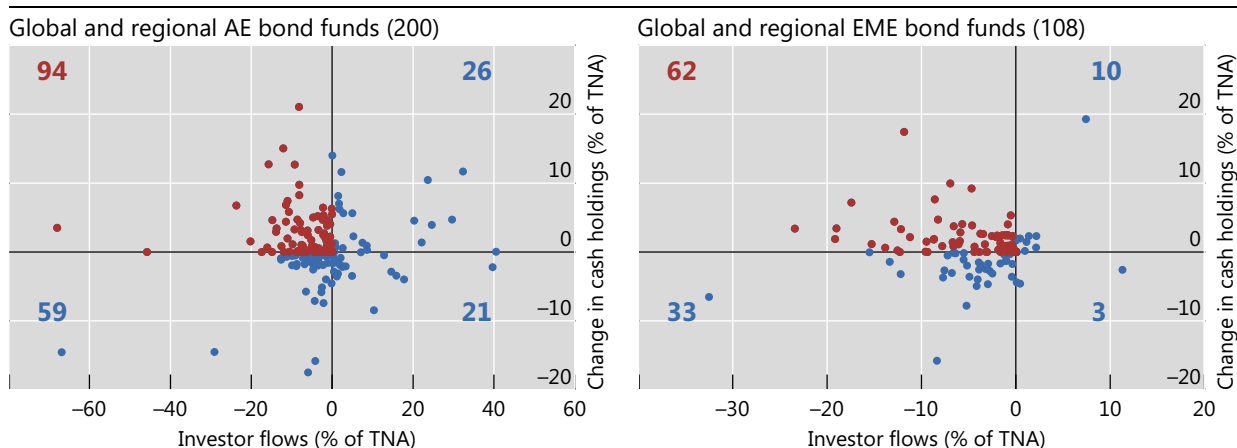
¹ For a fuller theoretical discussion and evidence around the taper tantrum period, see Morris et al (2017) and Shek et al (2018). For accounts of investor redemptions on bond funds in March 2020, see Hofmann, Shim and Shin (2020) and Vissing-Jørgensen (2021). Falato et al (2020) show that both the illiquidity of fund assets and the vulnerability to fire sales were important factors in explaining outflows from corporate bond funds. Finally, Jiang et al (2020) use the Covid-19 crisis as a natural experiment and find that bonds with higher pre-crisis fragility experienced more negative returns and larger reversals around March 2020.

hoarding. Our findings underline the importance of fund managers' liquidity management practices when assessing the overall market impact of asset sales by open-ended funds.

Liquidity management by bond mutual funds during the Covid-19 shock

To meet obligations to investors, fund managers hold cash in addition to their securities holdings. Facing relatively small redemptions, a fund manager may draw down cash buffers before selling the underlying assets. This is the prediction of the "pecking order" theory of fund liquidity management.² Facing relatively large redemptions during market stress, the manager may anticipate further redemptions and try to secure enough cash to meet possible future redemptions. If so, a manager facing outflows may add to cash holdings by selling more bonds than is necessary to meet redemptions. Total sales of assets can then be decomposed into *investor flow-driven sales* and the *discretionary sales* that add to cash holdings, where the latter is defined as sales beyond that necessary to meet redemptions (Shek et al (2018)).

Investor flows and change in cash holdings by bond mutual funds in March 2020 Graph 1



TNA = total net assets. The number in brackets shows the number of funds in each category whose data on cash holdings and investor flows are available in the months of February and March 2020. The top right quadrant is when both the monthly change in cash holdings and investor flows are positive or equal to zero; the bottom right quadrant is when the change in cash holdings is negative and investor flows are positive or equal to zero; the bottom left quadrant is when both the change in cash holdings and investor flows are negative; the top right quadrant is when the change in cash holdings is positive or equal to zero and investor flows are negative.

Sources: EPFR; authors' calculations.

In the stress episode of March 2020, the build-up of cash buffers by funds was the norm rather than the exception. Graph 1 shows the redemptions and change in cash holdings in March 2020 of global and regional mutual funds investing in AE bonds and EME bonds. The horizontal axis measures investor flows as a percentage of total net assets (TNA) at the beginning of March 2020, while the vertical axis measures the change in cash holdings during the same period, also measured as a percentage of TNA. The numbers in each quadrant indicate how many funds fall into the four possible combinations of positive or negative net redemptions and change in cash holdings. In both panels of Graph 1, the red dots in the top left quadrant indicate funds that saw a combination of investor outflows *and* increases in cash holdings. Among funds that experienced net redemptions, a large majority saw an increase in cash balances.

The practice of adding to cash balances in the face of investor redemptions was particularly pronounced among EME bond funds in March 2020. Our sample of 105 EME bond funds experienced large investor outflows in the stress period (red bars in the top left-hand panel of Graph 2) and at the same time increased cash holdings (blue bars in the panel). Risk-averse liquidity management of EME bond funds has been well documented (Morris et al (2017) and Shek et al (2018)). Indeed, we find the

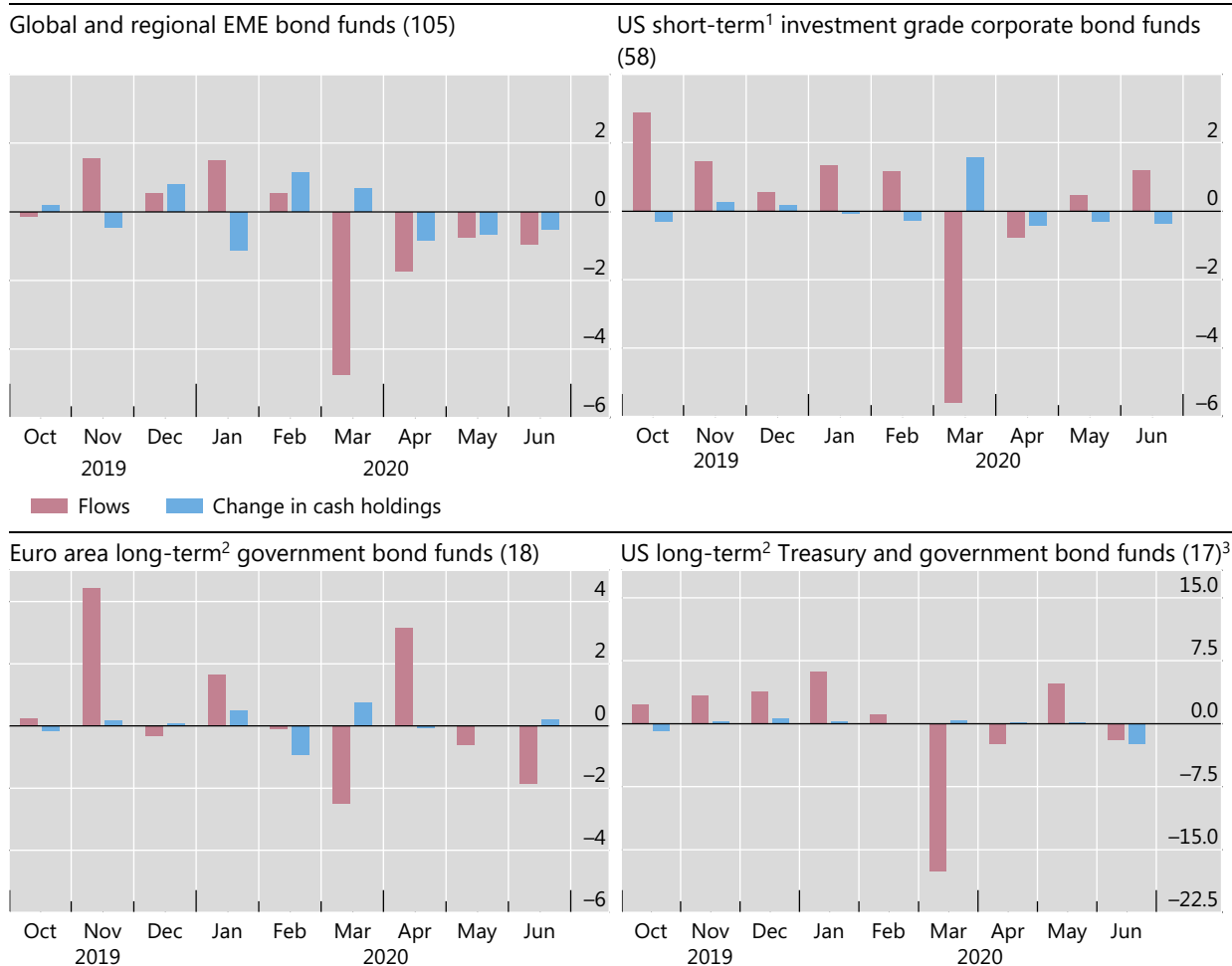
² See eg Chernenko and Sunderam (2016) and Ma et al (2020). This Bulletin shows that the interactions between the asset and liability sides of bond mutual funds generate different predictions from the pecking order theory.

magnitude of cash accumulation of EME bond funds in March 2020 (16% in relation to investor inflows) to be roughly of the same magnitude as that during the taper tantrum of 2013. It is notable that, perhaps in anticipation of redemptions, EME bond funds already started to increase their cash holdings more than investor inflows in February 2020 through discretionary sales of underlying assets.

Investor flows and change in cash holdings of AE and EME bond mutual funds

As a percentage of total net assets

Graph 2



The number in brackets shows the number of funds in each category whose data on cash holdings and investor flows are available in EPFR or Lipper between September 2019 and June 2020.

¹ Average maturity of one to three years. ² Average maturity of five years or longer. ³ Sum of six US long-term Treasury funds and 11 US long-term government bond funds.

Sources: EPFR; Lipper Investment Management; authors' calculations.

While such "cash hoarding" by EME bond funds was well known, what was new in March 2020 was that such liquidity management practices were also observed for AE bond funds, encompassing funds invested in US corporate bonds, euro area government bonds and US government bonds. The top right-hand panel of Graph 2 shows that US investment grade corporate bond funds faced large redemptions (5.6% of TNA) in March 2020; at the same time, they increased cash holdings substantially (1.5% of TNA). We find similar evidence for funds investing in securities issued by euro area governments or supranational agencies. In particular, the bottom left-hand panel of Graph 2 shows that euro area long-term government bond funds hoarded cash in March 2020 and that the size of cash hoarding relative to redemptions was large (28%). Finally, there is also evidence of cash hoarding in funds invested in very liquid US long-term government securities (bottom right-hand panel) that witnessed a historically unprecedented redemption shock to the tune of almost 20% of assets under management. That said, the extent of cash hoarding by

US government bond funds relative to investor outflows was smaller than that for their euro area counterparts.

Did larger cash buffers mitigate redemption pressures and cash hoarding?

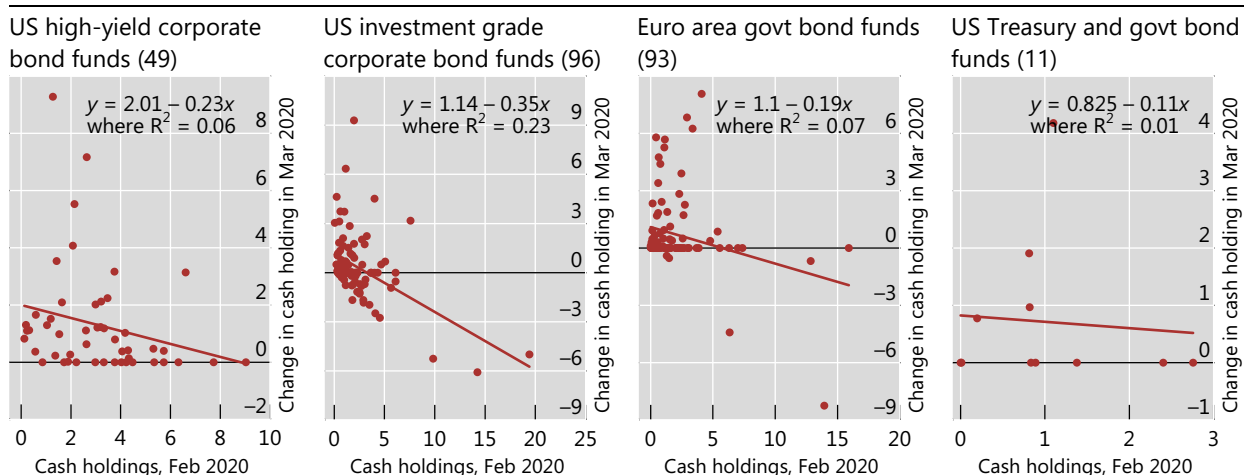
When we compare net investor flows in March 2020 with the level of cash holdings at end-February 2020, we see no clear positive or negative relationship for the different groups of bond funds. This suggests that investors' "dash for cash" in March 2020 was rather indiscriminate, and that redemptions by end-investors were not sensitive to the initial holding of cash ahead of the stress episode – showing parallels to the experience of money market funds over the period (Avalos and Xia (2021)).³

At the same time, cash hoarding by fund managers partly depended on the cash buffers prior to the shock (Graph 3). Specifically, funds with lower levels of cash in February 2020 ramped up their cash holdings by more in March, while those with larger cash buffers were more willing to use them (negative slope in the scatter plot). We find such a negative relationship in the case of US corporate bond funds, euro area government bond funds and funds invested in US government securities. As such, these results confirm the intuition that mutual funds with larger initial cash balances were better able to weather the dash for cash without resorting to selling at the height of the stress period.

Cash holdings at end-February 2020 and increases in cash holdings in March 2020

As a percentage of total net assets

Graph 3



The figure in brackets shows the number of bond funds in each category that faced investor outflows in March 2020. The horizontal axis shows the ratio of cash holdings to total net assets (TNA) at end-February 2020, and the vertical axis an increase (+) or decrease (-) in cash holdings over March 2020 as a percentage of TNA.

Sources: EPFR; Lipper Investment Management; authors' calculations.

How much cash hoarding and initial cash holdings are related depends to some extent on the liquidity of the underlying assets. As we move from bond funds investing in less liquid US corporate bonds and euro area government bonds to those investing in more liquid US Treasuries/government agency bonds, the sensitivity of cash hoarding to the level of the ex ante cash ratio decreases. Specifically, the slope of the fitted line becomes less steep as the liquidity of the underlying bonds increases.

Finally, for each asset class, we examine the relationship between cash hoarding and asset sales to meet redemptions. The methodology follows Morris et al (2017) and Shek et al (2018) and decomposes total sales into investor flow-driven sales and discretionary sales. Graph 4 reveals a positive relation

³ As shown by Avalos and Xia (2021), money market funds (MMFs) that cater to large investors experienced substantial withdrawals during March 2020, in a manner that was largely unrelated to funds' liquidity conditions. Faced with the redemption shock, MMF portfolio managers attempted to preserve their funds' liquidity conditions. Eren, Schimpf and Sushko (2020) show that, facing escalating market turmoil in March 2020, market participants dashed for cash or something that resembles cash.

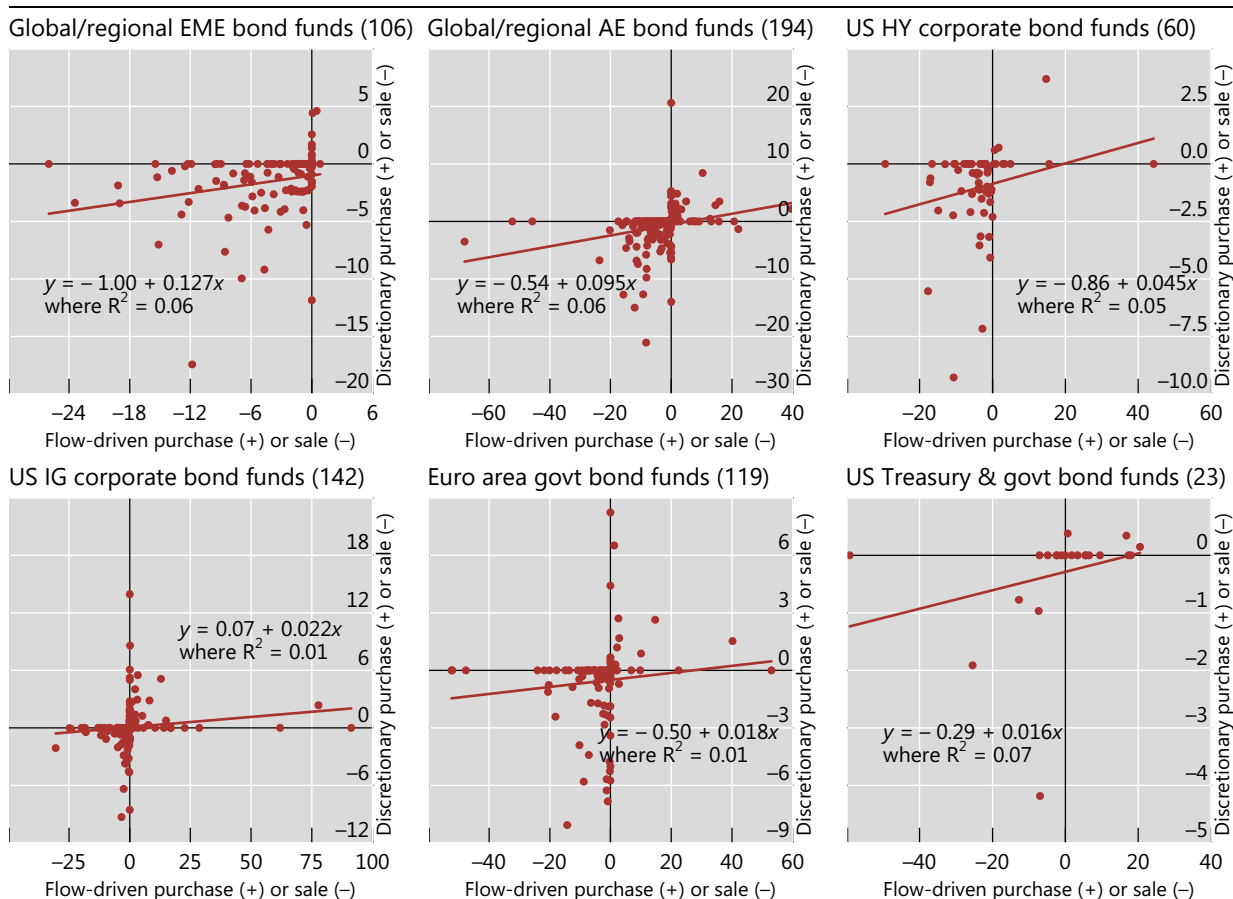
between the two, consistent with the findings in these studies. In other words, discretionary sales are large when investor redemption-driven sales are large. Moreover, the slope of the relationship is steeper for funds invested in more illiquid bonds (such as EME government bonds and US corporate bonds) than those with a higher liquidity (such as euro area government bonds and US Treasury and government sponsored enterprise bonds). As such, procyclicality of fund managers' behaviour will be stronger for funds invested in more illiquid instruments.

To give a sense of the magnitudes, when a fund invested in very liquid US government securities faces a \$100 investor redemption, the manager sells an additional \$1.60 worth of bonds to increase cash holdings. By contrast, when a fund invested in illiquid securities of EME bonds faces a \$100 investor redemption, the manager sells an additional \$12.70 worth of bonds to add to its cash holdings. These findings suggest that the intensity of cash hoarding may in the cross-section be linked to the illiquidity of the underlying bonds.

Flow-driven and discretionary bond purchases in March 2020

As a percentage of total net assets

Graph 4



The figure in brackets shows the number of funds in each category. The horizontal axis shows flow-driven bond purchases (+) or sales (-) as a percentage of total net assets (TNA) in March 2020, and the vertical axis discretionary purchases or sales as a percentage of TNA.

Sources: EPFR; Lipper Investment Management; authors' calculations.

Comparison with theoretical predictions

It is useful to compare our empirical findings with the predictions from theory. Bond fund managers attempt to balance competing objectives when deciding how much cash to hold. On the one hand, higher cash buffers may possibly reduce investor incentives to redeem as well as allow the fund to meet

redemption shocks without having to sell assets.⁴ On the other hand, larger buffers erode returns in normal times, making the funds less attractive to investors. The optimal cash buffer balances these two competing motives (Morris et al (2017)).

The March 2020 episode sheds useful additional light on these theoretical considerations. In our context, cash hoarding by a fund might be mitigated if the fund starts with a high level of liquidity, enabling them to avoid losses due to sales in stressed times. We have also seen that funds investing in less liquid bonds should have a larger precautionary cash holding to avoid cash hoarding compared with those investing in more liquid bonds.

The dash for cash may have caught AE bond funds by surprise in March 2020, as evidenced by the generally low cash holdings at the beginning of the stress period.⁵ As a result, when the shock hit in March 2020, more than 60% of AE bond funds had insufficient cash to meet March 2020 redemptions, while 45% of EME bond funds had insufficient cash. The lower number for EME bond funds may be explained by precautionary behaviour due to the history of similarly large redemption shocks in the past.

Our findings underscore the importance of considering the joint behaviour of investors and fund managers during market stress. Redemptions and the corresponding bond sales tend to be accompanied by fund managers' discretionary sale of bonds, above and beyond that warranted by redemptions.

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⁴ In particular, redemptions by one group of investors may exert negative spillovers on the remaining ones through the market-to-market changes in the value of the remaining assets as well as the shifts in the composition of the remaining assets from liquid to illiquid ones. The negative spillovers create a "first mover advantage" for those investors that seek early redemptions.

⁵ This is linked to the prediction of the model by Morris et al (2017) that if the shock has a low probability ex ante, the cash holding is lower, and hence the impact of a dash for cash will be higher.