



The role of non-bank financial intermediaries in the ‘dash for cash’ in sterling markets

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Financial Stability Paper No.47

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Executive summary

In March 2020, the Covid-19 (Covid) shock exposed vulnerabilities in the financial system. As a result of the public health measures taken to contain Covid and the sharp deterioration in the economic outlook, there were very large and sudden falls in the prices of a range of financial assets, and a tightening in market conditions. A ‘flight to safety’, in which prices of risky assets fell and prices of government bonds increased, was followed by an abrupt and extreme ‘dash for cash’ – where even safe assets were sold to obtain cash.

The Bank’s Financial Stability Reports and the Financial Stability Board’s (FSB’s) Holistic Review have provided evidence on how vulnerabilities in the non-bank financial system catalysed the ‘dash for cash’ across global financial markets. This paper provides additional quantitative evidence on several of these vulnerabilities and the way they interacted, focused on sterling markets. Specifically, it uses transaction-level data to explore in detail the behaviour of non-bank financial intermediaries (NBFIs) in UK government bond (gilt) and gilt repo markets during March 2020, and the extent to which liquidity demands on these NBFIs, and their actions to meet these demands, contributed to generating the ‘dash for cash’. The paper shows how vulnerabilities in the NBFIs sector, and their interaction, can amplify shocks and pose risks to financial stability. It also highlights the importance of improving data gathering to support the mapping of risk transmission through the financial system.

In gross terms, the volume of trading across the financial system was very large during the ‘dash for cash’.^[3] This is to be expected given that the actions taken by financial institutions required a large redistribution of liquidity around the system. Our data also show that the biggest increases in gross trading volumes reflected transactions with the NBFIs sector, which has grown as a proportion of the financial system. For example, the weekly gilt trading volume of insurance companies, pension funds and liability-driven investment asset managers (collectively referred to as ICPFs) during the ‘dash for cash’ was more than double their average weekly trading volume in 2019. Furthermore, asset managers, hedge funds and the foreign official sector all had a similar, significantly heightened demand to transact in the gilt market. These transactions were intermediated by the banking system, although dealers’ capacity for intermediation was particularly tested by the weight of demand from clients wishing to sell gilts relative to those wishing to buy. Similarly, NBFIs use of sterling repo markets increased sharply over this period, with the pace of increase very high relative to historical changes. This represented a large and fast expansion in NBFIs’ demand for intermediation in repo markets.

In addition, there was an increase in the net demand for liquidity from the NBFIs sector. We find evidence that the NBFIs sector became a net seller of gilts during the ‘dash for cash’, driven by the actions of ICPFs as well as asset managers (including open-ended funds). Net sales by ICPFs and asset managers were very large by historical standards – totalling around £6 billion over nine days from 9–19 March, with several consecutive days of net sales above the 99th percentile of the historical distribution of NBFIs net sales. This placed pressure on dealers, whose purchases from ICPFs and asset managers alone exceeded the 90th percentile of the historical distribution of dealers’ net purchases from all sectors. While we find evidence that net gilt sales by the foreign official sector were significantly elevated relative to normal levels (selling approximately £1 billion of gilts), they appear to have been only a small factor in aggregate net sales – in particular when compared to the dynamics in the US Treasury market. Dealer net purchases over this period reached £10 billion, or 0.9% of the total amount outstanding of conventional gilts, which was larger in relative terms than US primary dealers’ net purchases of US Treasuries (0.4% of conventional US Treasuries outstanding).

While hedge funds also sold gilts in early March, as a subsector they were net buyers during the ‘dash for cash’. The role of hedge funds in the US Treasury market turmoil has been documented extensively (see, for example, Schimpf et al (2020) and Cunliffe (2020)). The literature provides evidence for forced selling of US Treasury securities by funds who had attempted to exploit small yield differences through leveraged arbitrage strategies. While this dynamic may have been at play in the UK gilt market for individual hedge funds – potentially contributing to the selling pressure – we find little evidence for such behaviour on a larger scale. Rather, the hedge fund sector accumulated gilts in both the ‘flight to safety’

and ‘dash for cash’ periods.

There was also a net liquidity demand from NBFIs in the gilt repo market over both the ‘flight to safety’ and ‘dash for cash’ periods. During the ‘flight to safety’ period, there was a cumulative net liquidity demand of £10.5 billion from the gilt repo market, as ICPFs and hedge funds increased their cash borrowing, while money market funds (MMFs) reduced their cash lending. Following this, NBFIs withdrew around £8 billion of lending from the gilt repo market during the ‘dash for cash’, while the sector demanded a further £7 billion in cash borrowing. This resulted in a £15 billion net liquidity demand in gilt repo markets over the ‘dash for cash’ period.

Taken together, the increased demand for intermediation, combined with dealers’ inability or unwillingness to further expand intermediation capacity, was sufficient to generate a sharp rise in gilt yields, bid-ask spreads, and premiums on repo borrowing – with stress in gilt repo markets likely exacerbating dysfunction in the cash gilt market. It was only once the Bank of England and other central banks announced additional large-scale liquidity injections that market functioning started to recover. In addition to its standing liquidity facilities, the use of which had risen sharply, the Bank committed to gilt purchases of approximately £13 billion per week for a prolonged period and activated its Contingent Term Repo Facility (CTRF), which was available for banks to borrow at unlimited size. This quickly improved market functioning, although financial conditions remained tighter than normal for a period and continued interventions were necessary to support businesses and households through the crisis, and limit any lasting damage to the economy.

To measure the extent to which particular vulnerabilities have catalysed the ‘dash for cash’, this paper also looks at the different sources of demand for liquidity in gilt and repo markets, and how these interacted to put strain on the system as a whole.

Variation margin (VM) calls on derivatives trades placed substantial liquidity needs on NBFIs. As yields rose and sterling depreciated during the ‘dash for cash’, the NBFIs sector faced net VM payments of more than £12 billion. To provide a historic comparison, daily VM calls reached up to 5.6 times the January average (in the case of clearing members’ client accounts at UK central counterparties (CCPs)). Initial margin (IM) calls intensified these liquidity needs: from mid-February, non-bank clients of UK CCPs faced a rising amount of IM demands, which accelerated and increased to a total of £1.2 billion during the ‘flight to safety’, and another £2.4 billion during the ‘dash for cash’.

Redemptions from MMFs was one way in which NBFIs sought to raise cash. Once the ‘dash for cash’ had started, NBFIs withdrew from MMFs (which saw a total of £25 billion in redemptions in the period between 12–20 March). To meet these redemptions, MMFs drew down on daily liquidity buffers, including withdrawing funds from gilt repo markets (£4 billion), and sold or matured longer-dated commercial paper and certificates of deposit (£14 billion) to also build up precautionary buffers. This partly exacerbated the ‘dash for cash’ by transforming liquidity needs into pressure on short-term funding markets.

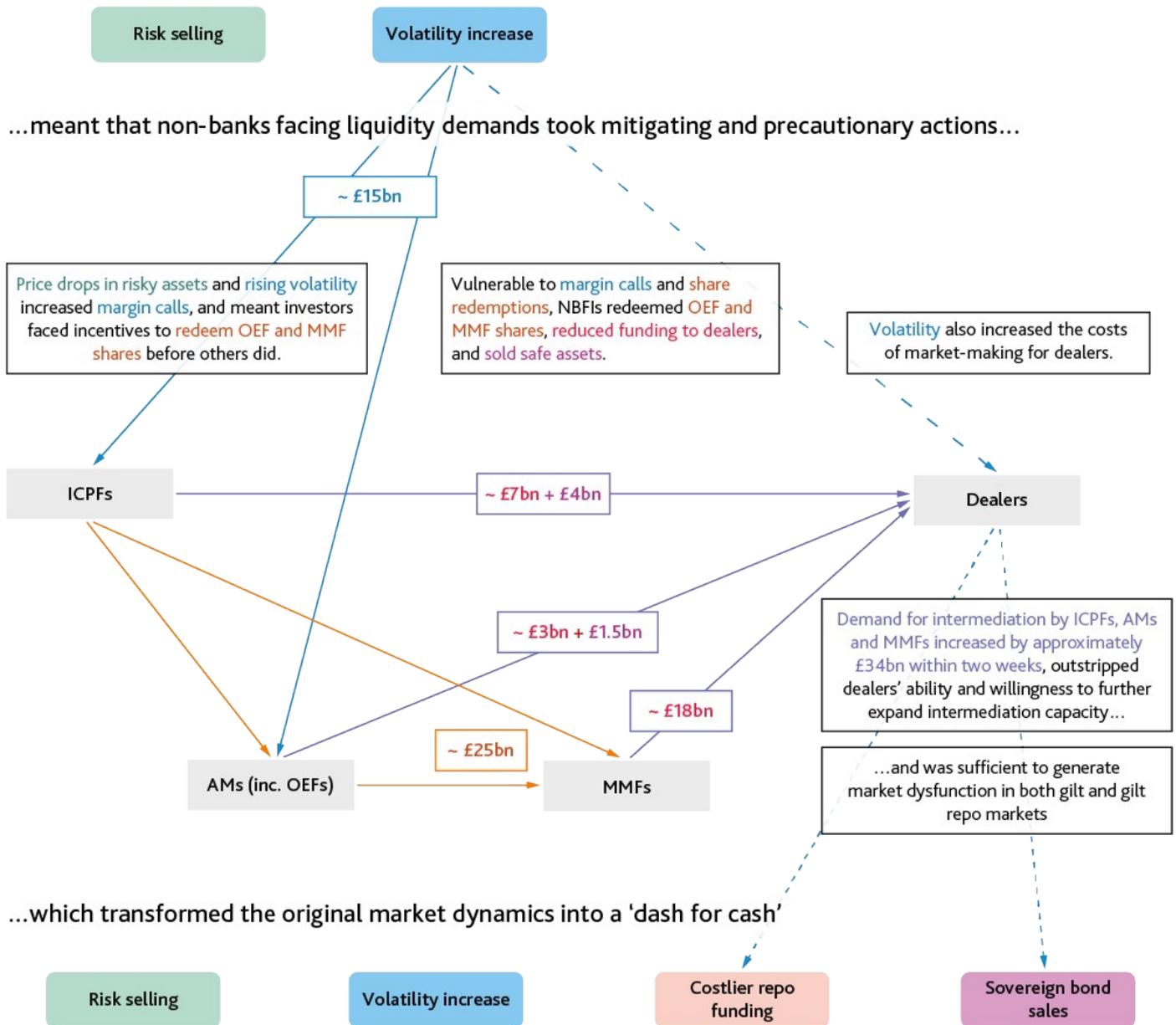
Furthermore, redemptions from open-ended funds (OEFs) resulted in selling in gilt and corporate bond markets. Outflows from OEFs investing in advanced-economy bonds started in mid to late February, and reached up to 5% of assets under management (AUM) in March. For example, sterling corporate bond funds faced total net outflows of around £1.4 billion (around 1.3% of their AUM) during March. These net outflows mask significantly larger outflows during the ‘dash for cash’, which were partly offset by inflows received during the ‘flight to safety’. OEFs sold gilts and riskier assets to meet these redemptions, but also to build up precautionary buffers. On aggregate, asset managers sold around £1.5 billion of gilts and £2.5 billion of sterling corporate during the ‘dash for cash’.

Overall, participants in the NBFIs sector took a range of mitigating and precautionary actions in light of the developments in the real economy and in financial markets. As shown in Figure 1, these actions, and their interaction with underlying vulnerabilities in the NBFIs sector, resulted in risks to financial stability and had the potential to spill over into the banking system and the wider economy.^[4] For example, each non-bank’s action could result in another non-bank facing higher liquidity needs: such as redeeming OEF or MMF shares to meet margin calls, meaning these funds have to withdraw cash from short-term funding markets or sell gilts and other assets. And the cumulative effect of NBFIs’ actions outstripped dealers’ ability and willingness to intermediate in gilt and gilt repo markets, and hence contributed to dysfunction in these markets. This underscores the need to examine the demands of the NBFIs sector for liquidity in stress, as previously highlighted by the Financial Policy Committee (FPC).



The dash for cash episode also highlights the importance of analysing interconnectedness across the financial system as a whole. Although we provide new evidence for the drivers of the 'dash for cash' in sterling markets, we remain hampered by a lack of data. For instance, we do not account for the effects of liquidity needs in non-sterling currencies, which are known to have played an important role during the 'dash for cash'. Similarly, our analysis could also be improved through more granular data on NBFIs flows, holdings, and transactions. An even more comprehensive picture of the 'dash for cash' could be drawn if we were able to bridge these data gaps. More generally, addressing these data gaps would support the mapping of risk transmission through the financial system, and enhance our understanding of the resilience of the system as a whole.

Figure 1: Liquidity demands during the ‘dash for cash’ in sterling markets
 The ‘flight to safety’ observed in response to the Covid-19 economic shock...



Colour key and data coverage

- Sectors (ICPFs: Insurance companies, pension funds, and liability-driven investment asset managers. AMs: Asset managers. OEFs: Open-ended funds. MMFs: Money market funds.)
- Market dynamics
- ← Selling of risky assets
- ← ← ← Margin calls (9–23 March)/Increased market risk/limited market-making
- ← Redemptions from MMFs (12–20 March)
- ← Liquidation of gilts (9–19 March)
- ← Tightening in funding markets (9–23 March for repo, 2–31 March for commercial paper and certificates of deposit)

Sources: Bank of England Sterling Money Market data collection, Crane data, EMIR Trade Repository Data, FCA transaction (MiFID II) data, Morningstar, Supervisory returns and Bank calculations.

1: Introduction

In March 2020, the Covid-19 shock exposed underlying vulnerabilities in the financial system, which catalysed an abrupt and extreme ‘dash for cash’, in which non-bank investors sold off even safe assets to raise cash.

The rapid spread of the Covid-19 (Covid) pandemic in March 2020 had a profound impact on financial markets around the globe. Asset prices fell sharply and suddenly, volatility increased substantially, and market liquidity dried up as market participants reacted to the impact of the pandemic on economic activity and the uncertainty around the scope and duration of public health measures.

The large magnitude of the shock also exposed underlying vulnerabilities in the financial system – many of which had been previously highlighted by the Financial Policy Committee (FPC) as potential contributors to a stress, such as the fragile nature of market liquidity. A ‘flight to safety’ episode, starting in late February, turned into an abrupt and extreme ‘dash for cash’, in which non-bank investors sold off even safe assets such as long-term government bonds to obtain cash. NBFIs also tried to raise short-term funding through the gilt repo market, but the exceptional borrowing demand exceeded the limited lending supply. As a consequence, liquidity in both cash gilt and term gilt repo markets dried up, and financing conditions tightened significantly. In the case of NBFIs, the liquidity demands were mainly driven by substantial margin calls on derivative exposures, large redemptions from open-ended and money market funds, and precautionary liquidity hoarding by some investors. These liquidity demands amplified the initial shock and had an adverse impact on other investor groups due to the structure and interconnectedness of the financial system (Kashyap (2020)).

While the Covid shock was exceptional, its amplification due to market vulnerabilities increased the reliance on central bank support to address dysfunction in key markets and suggests there is a need to review the resilience of investors and markets under stress.

The quick and large-scale responses by central banks around the globe, together with fiscal policy measures, managed to restore market functioning and helped to avoid a prolonged tightening of financing conditions, which could have exacerbated the damage to output and employment.

While the situation warranted these interventions, an important question that arises is whether the NBFIs are sufficiently resilient to withstand severe liquidity strains. The Financial Stability Board’s (FSB’s) Holistic Review of the ‘dash for cash’ looked in detail at vulnerabilities that were exposed and concluded that there is a need to strengthen the resilience of the NBFIs sector. Recognising the global nature of markets, work to do this is being co-ordinated internationally. The five main areas of focus are on risks relating to money market funds (MMFs) and other open-ended funds (OEFs), margin calls in stress, the role of leveraged investors in core markets, limits to dealers’ capacity to intermediate markets, and to assess the linkages and exposures between different parts of the system.

This paper aims to investigate how the different vulnerabilities interacted and reinforced each other, with a focus on the NBFIs sector and sterling-denominated assets.

Our paper aims to document the dynamics in February and March 2020 for several of the areas outlined above. We are particularly interested in sterling-denominated assets, the impact of the NBFIs sector on financial stability, and how the linkages and exposures in the financial system amplified the initial shock. However, it is beyond the scope of this paper to analyse in detail the constraints on dealer intermediation capacity, and funding needs in other currencies, although both factors are known to have played an important role during the ‘dash for cash’. A detailed analysis of the implications of central bank interventions is also beyond the scope of our paper.

2: An overview of the ‘dash for cash’ dynamics

2.1: What were the likely market dynamics and participant behaviours which amplified the ‘dash for cash’?

Evidence on the drivers of the ‘dash for cash’ is still emerging...

Since March 2020, official and academic publications have provided evidence for the likely drivers of the ‘dash for cash’.

Several publications have focused on market-specific issues, providing evidence for their contribution to the ‘dash for cash’. For instance, Duffie (2020) analyses the role of dealers in US Treasury markets, and Hüser et al (2021) analyse the gilt repo market.

Other publications focus on the role of specific institutions and mechanisms during the ‘dash for cash’. For instance, Eren et al (2020), Li et al (2021) and Avalos and Xia (2021) focus on the role of MMFs, Liang (2020) analyses the behaviour of open-ended bond funds in the US corporate bond market, Segal-Knowles (2021) focuses on the role of margin, and Schrimpf et al (2020), Barth and Kahn (2020) and Cunliffe (2020) discuss the role of leveraged investors in fixed-income markets.

Last, other publications analyse the system as a whole, outlining the contribution of different activities to the overall stress. The FSB’s holistic review, for instance, analyses the role of margin, open-ended investment funds, dealers, and leveraged non-bank investors. Similarly, the Bank of England’s May and August Financial Stability Reports provide evidence on the five vulnerabilities outlined in the introduction. Finally, Hauser (2020), Kashyap (2020), and Hall (2021) present accounts of how and why the ‘dash for cash’ may have unfolded.

These publications also emphasise the need for further analysis regarding the role of these vulnerabilities – not least to understand the extent to which any risks may need to be mitigated.

...but it is possible to build a stylised picture of the dynamics which catalysed it, as shown in Figure 2.1.

Before pursuing detailed analyses of the drivers of the ‘dash for cash’, it is already possible to map how different activities contributed to it. Figure 2.1 presents a stylised map for the contribution of different activities to the ‘dash for cash’.

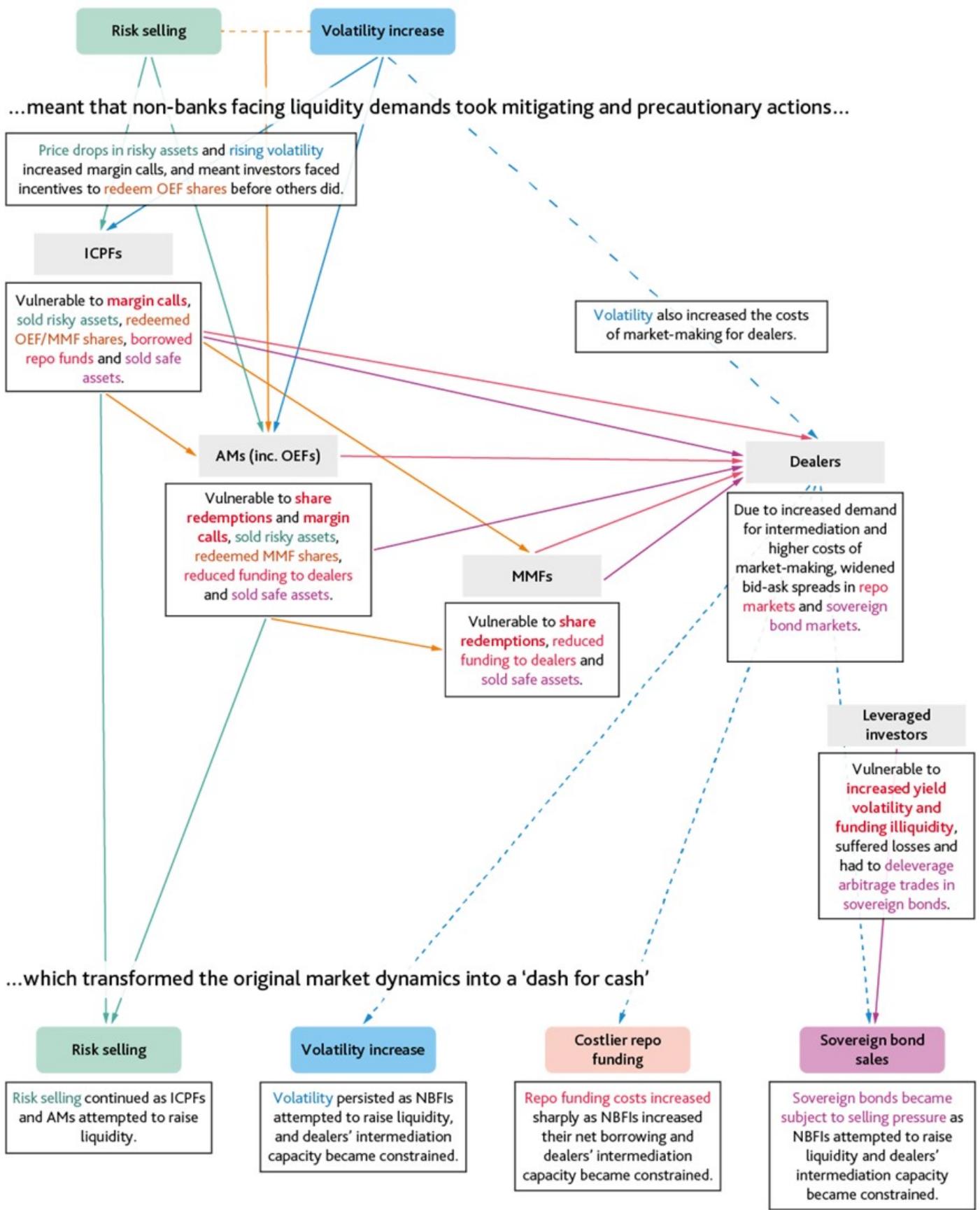
At the outset of the Covid shock and until early March, market dynamics were akin to a ‘flight to safety’, in which prices of risky assets fell, prices of advanced-economy government bonds increased, and price volatility rose.

This rise in volatility, coupled with the creation of new derivative positions, resulted in increased margin payments, part of which required the use of cash. Firms receiving margin payments had to decide where to place the proceeds, while those needing to pay margin – or anticipating future margin calls – could raise cash through the sale of risky and safe assets, by withdrawing shares from MMFs (and in some instances from OEFs), or by borrowing in repo funding markets. Some OEFs – facing both redemptions and increased margin calls – had to raise cash by selling mainly liquid assets such as gilts or highly rated corporate bonds, and by withdrawing shares from MMFs and funds placed in repo funding markets. Last, MMFs had to meet redemptions by selling some short-term assets and by withdrawing their positions in repo funding markets.

In aggregate, these actions required a large redistribution of liquidity across the financial system. And the NBFi sector had a significant net demand for liquidity which it tried to meet via sales of bonds, and via funding through repo markets. Volatility also increased the costs of market-making for dealers, which were facing increased demand for intermediation as well as a reduced supply of repo funding. As a result, dealers widened their bid-ask spreads in repo and bond markets, exacerbating illiquidity. In addition, the volatility in yields, coupled with funding illiquidity, imposed losses on highly levered investors, some of which became forced sellers of both safe and risky assets.

Over time, the liquidation of safe assets, coupled with dealers’ inability or unwillingness to further expand intermediation capacity, led to rising bond yields and accelerated the initial liquidity demands. This reinforced, and drove additional, responses by non-bank participants, thereby further exacerbating the ‘dash for cash’ dynamics.

Figure 2.1: Stylised map of the ‘dash for cash’
 The ‘flight to safety’ observed in response to the Covid-19 economic shock...



Colour key

■ Sectors (ICPFs: Insurance companies, pension funds, and liability-driven investment asset managers. AMs: Asset managers. OEFs: Open-ended funds. MMFs: Money market funds.)



2.2: Which market dynamics does this paper analyse?

This paper provides evidence for the impact of NBFi behaviour on gilt and gilt repo markets, which are key markets in the UK financial system.

While the stylised ‘dash for cash’ dynamics shown in Figure 2.1 varied across countries, it is likely that similarities exist among countries with similar financial industry structures. As a result, the dynamics arising in a specific country are likely to be relevant for others. In this context, this paper contributes to the existing literature by analysing specifically the role of NBFIs during the ‘dash for cash’ in UK sterling markets.

In particular, Section 3 of this paper provides evidence for the behaviour of NBFIs in the gilt and gilt repo markets, during the ‘flight to safety’ and ‘dash for cash’ periods. To provide background, Box A outlines the ‘business as usual’ role of NBFIs in gilt (and gilt repo) markets.

As shown in Figure 2.1, liquidity demands faced by NBFIs may have generated some of the increased pressure in gilt and gilt repo markets. To shed light on these, Section 4 presents evidence on the margin calls faced by NBFIs, and on the redemptions faced by MMFs and other OEFs, and the strategies to meet these liquidity demands.

Conditions in gilt and repo markets were also impacted by dealers’ inability or unwillingness to further expand intermediation capacity.

Figure 2.1 also shows the central role that dealers played in the ‘dash for cash’. Dealers initially accommodated the sharp increase in gross flows, as liquidity was redistributed around the system. However, they faced heightened volatility in the securities and repo markets they intermediate and their capacity to intermediate was limited, so they responded by sharply increasing their bid-ask spreads. This raised the cost of funding in repo markets, and exacerbated market volatility. However, a detailed analysis of dealer constraints and the effects on market functioning during the ‘dash for cash’ is beyond the scope of this paper.

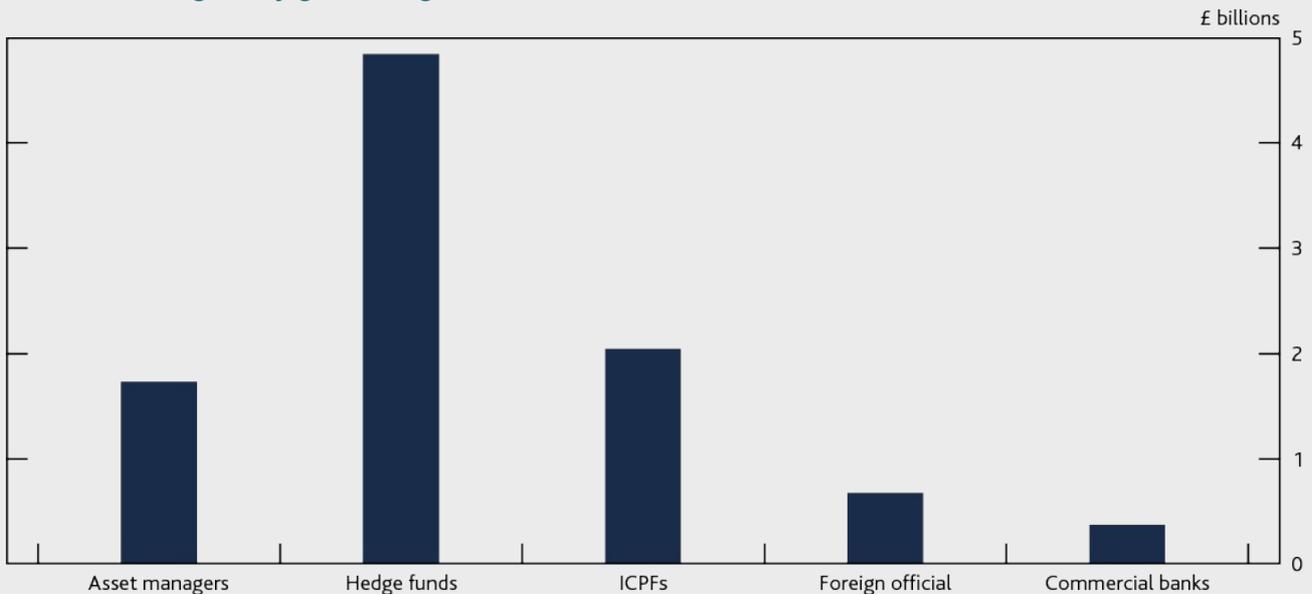
Box A: The ‘business as usual’ role of NBFIs in gilt and gilt repo markets

Overview of gilt and gilt repo markets

Gilts (UK government bonds) are the primary means of market-based financing for the UK government. They also play a key role in providing a safe asset to the UK financial system. As such, they are central to banks’ high-quality liquid asset (HQLA) buffers and play a crucial role as collateral for secured financing transactions, such as repos. Most firms typically trade bilaterally (or ‘over the counter’) with dealers in the gilt market.

The gilt repo market is an essential funding market for the non-bank sector and facilitates the movement of cash and securities around the financial system (Bank for International Settlements (2017)). Cash lenders in repo markets are able to generate low-risk returns while still holding liquid collateral, and cash borrowers can use repo markets to meet liquidity needs or to increase their leverage. In addition, gilt repo markets are used by intermediaries in the cash gilt market to fund gilt positions. Repo markets, therefore, help to efficiently allocate resources in the financial system. As with the gilt market, most firms typically trade bilaterally with dealers in the gilt repo market.

Chart A: Average daily gilt trading volumes in 2019

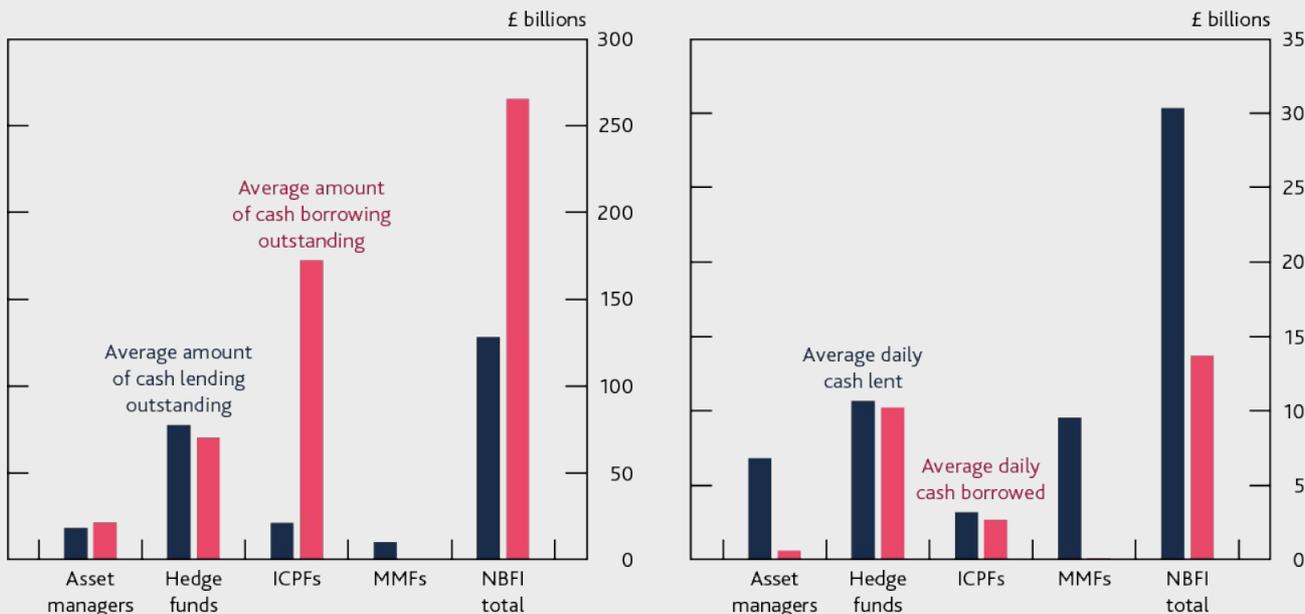


Sources: FCA transaction (MiFID II) data and Bank calculations.

Chart B: Average stock and average daily traded volume of gilt repo borrowing and lending over 2019

Panel 1: Average stock over 2019

Panel 2: Average daily traded volume over 2019



Sources: Bank of England Sterling Money Market data collection and Bank calculations.

Important non-bank market participants in gilt and gilt repo markets

In the cash gilt market, the non-bank trading volume with dealers is made up primarily of hedge funds, ICPFs (predominantly pension funds and liability-driven investment asset managers) and asset managers, as shown in Chart A. Commercial banks and the foreign official sector account for a relatively small share of the entire trading volume. It should be noted that while we focus on the NBFIs activity in the gilt market, the interdealer component also makes up a significant proportion of traded volumes in gilts in gross terms. We include interdealer transactions in our analysis but do not focus on this market segment – see Annex for more details on the data used in this paper.

Turning to the gilt repo market, it is notable that ICPFs are significant participants operating in the longer maturity (or ‘term’) segment; this is because such firms rely on longer-term leverage to manage their liabilities as part of their liability-driven investment (LDI). The most common LDI strategy is to use existing holdings of gilts as collateral to borrow cash, which is then invested in further conventional and inflation-linked gilts. As a result of this longer-term repo activity, these sectors account for a considerable proportion of the stock (nominal amount outstanding) of gilt repo despite the comparatively small daily traded volumes (Chart B.).

While hedge fund exposure to gilts is relatively small in comparison to other sovereign bond markets, it is large relative to other non-bank sectors. Hedge funds use the gilt repo market to borrow cash in order to fund long positions. The chart shows that hedge funds’ gilt repo borrowing is largely matched by cash lending – for example, to borrow securities that they sell short. However, despite having high gross volumes in the overnight and medium maturity gilt repo segments as a result of this activity, hedge funds take relatively low net positions in the gilt repo market, which is atypical among non-bank participants (Chart B).

Funds (mainly MMFs) are important lenders of cash, primarily overnight, in the gilt repo market (Chart B). MMFs tend to operate at short maturities because they are designed to offer very low credit risk and high liquidity to investors.

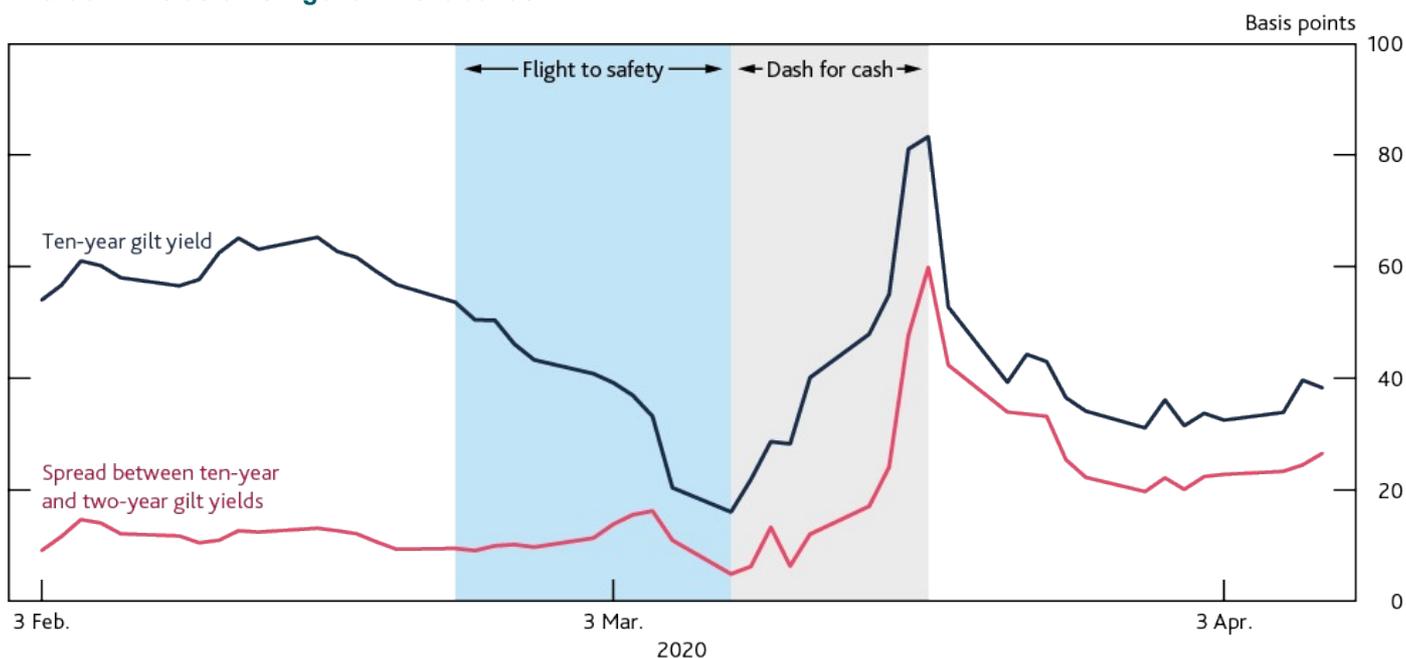
3: NBFi behaviour in stressed UK markets

3.1: How did NBFIs behave in the gilt market?

The onset of the Covid pandemic led to an initial ‘flight to safety’ period, which saw falling gilt yields.

Prices of risky assets fell during February and the early part of March 2020, while the prices of UK government bonds (gilts) increased and hence gilt yields decreased (Chart 3.1). This was driven by investors seeking to de-risk – for example by selling risky assets and buying gilts – as well as by expectations of lower short-term interest rates. Gilt market conditions remained orderly during this period, and bid-ask spreads moved in their usual range (Chart 3.2).

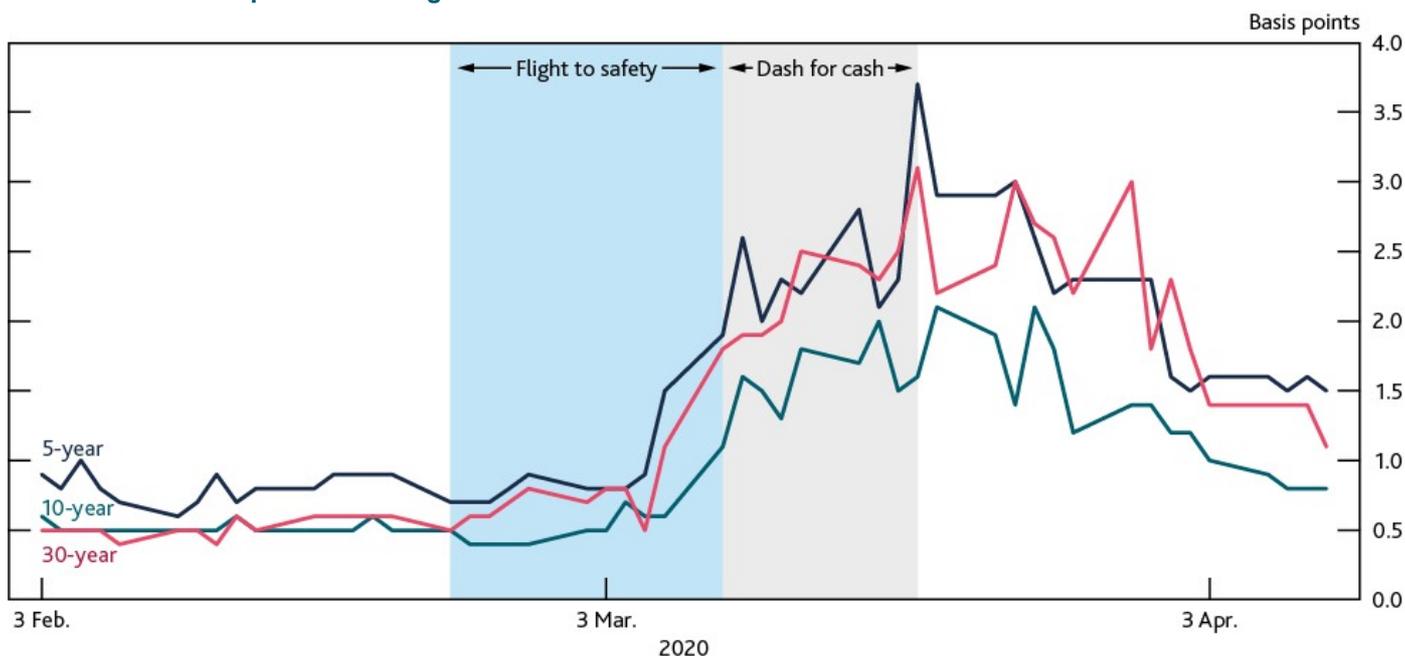
Chart 3.1: Yields on UK government bonds



Sources: Bloomberg Finance L.P., Tradeweb and Bank calculations.

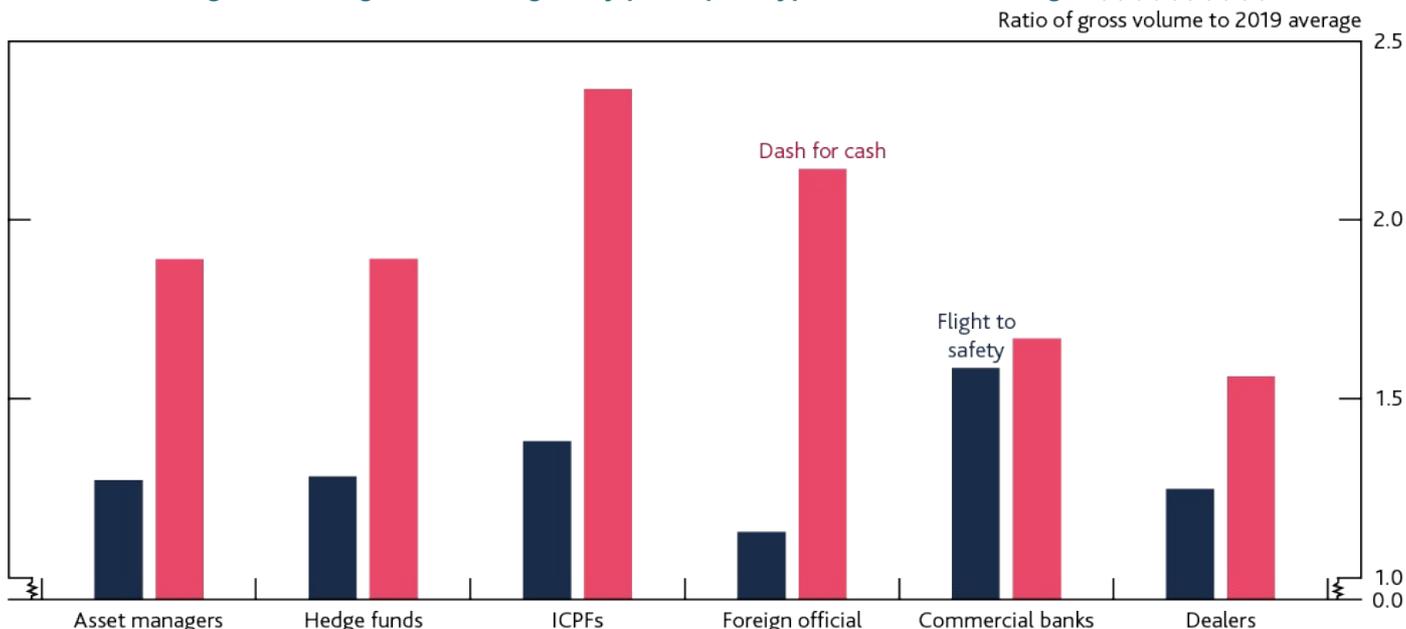
In mid-March, this became an abrupt ‘dash for cash’ characterised by a large redistribution of liquidity and high demand for cash.

From 9 March, even typically highly liquid assets such as UK government bonds came under forced selling pressure. The exceptionally high selling pressure triggered a sharp rise in gilt yields and a steepening of the yield curve (as illustrated by the increased spread between the ten-year and two-year gilt yields in Chart 3.1), similar to the developments in other sovereign bond markets. As daily gilt trading volumes increased across different maturities, bid-ask spreads widened to around 3 basis points for gilts with a five-year maturity, and to more than 1.8 basis points for the usually highly liquid ten-year maturity (Chart 3.2).

Chart 3.2: Bid-ask spreads on UK government bonds


Sources: Refinitiv Eikon from LSEG and Bank calculations.

To facilitate the large redistribution of liquidity across the system, gross transaction volumes in gilts were very high during the ‘dash for cash’ period relative to the average activity in 2019. As shown in Chart 3.3, dealers’ weekly trading volume in gilts was 60% higher than their average weekly trading volume during 2019, while ICPF’s volumes during the ‘dash for cash’ were 2.4 times higher. Furthermore, asset managers, hedge funds and the foreign official sector all had a similar, significantly heightened demand to transact in the gilt market. These flows were intermediated by the banking system, although dealers’ capacity for intermediation was particularly tested by the weight of demand from clients wishing to sell gilts relative to those wishing to buy.

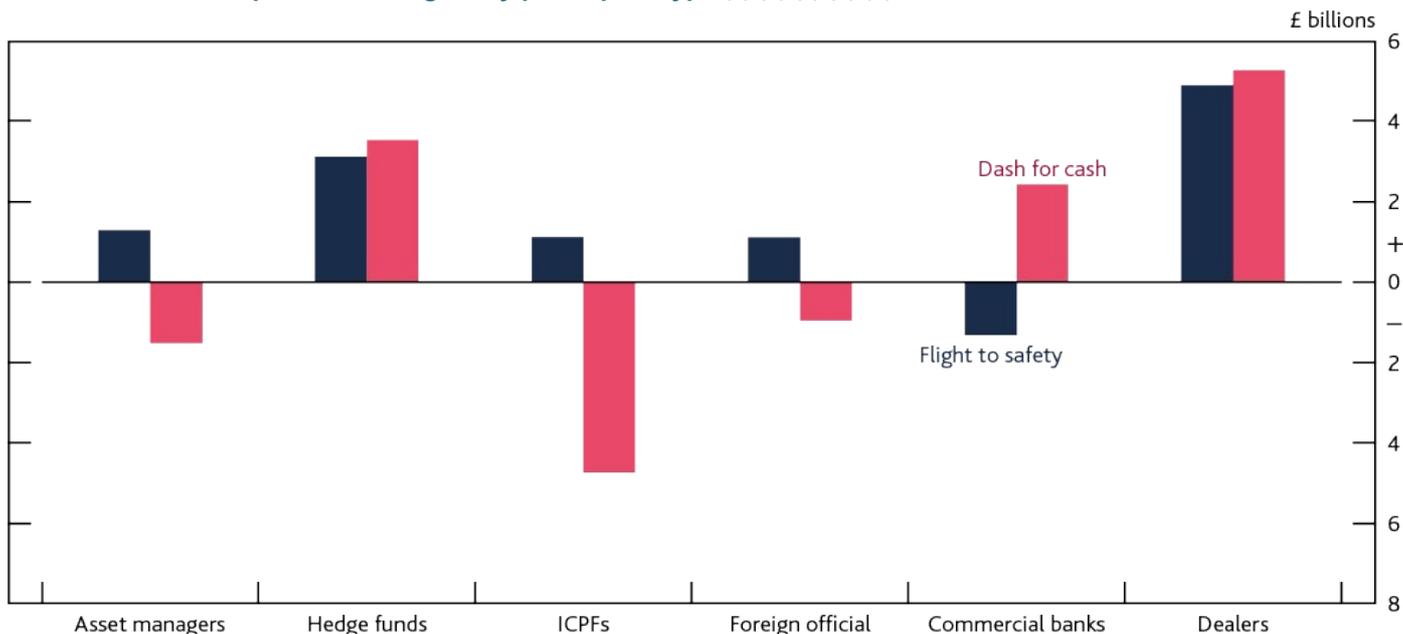
Chart 3.3: Total gross trading volumes of gilts by participant type above 2019 averages (a) (b) (c) (d) (e)


Sources: FCA transaction (MiFID II) data and Bank calculations.

- (a) For all conventional and inflation-linked gilts.
- (b) 'Flight to safety' defined as 24 February to 6 March.
- (c) 'Dash for cash' defined as 9–19 March. We end the 'dash for cash' period on 19 March for cash gilts only because yields and bid-ask spreads decreased significantly following the MPC announcement on this day.
- (d) The ICPF category includes pension funds, insurers, and liability-driven investment asset managers.
- (e) Dealers' volumes also include interdealer trading volumes and volumes traded with other sectors not shown on the chart.

The NBFIs sector as a whole became a net seller of gilts during the 'dash for cash' period.

Chart 3.4 shows the sectoral net purchasing activity in the cash gilt market during the 'flight to safety' and 'dash for cash' periods. NBFIs – hedge funds, asset managers and ICPFs – were net buyers of gilts during the 'flight to safety'. These gilt purchases likely contributed to falling yields during this period.

Chart 3.4: Total net purchases of gilts by participant type (a) (b) (c) (d) (e)


Sources: FCA transaction (MiFID II) data and Bank calculations.

- (a) For all conventional gilts.
- (b) 'Flight to safety' defined as 24 February to 6 March.
- (c) 'Dash for cash' defined as 9–19 March. We end the 'dash for cash' period on 19 March for cash gilts only because yields and bid-ask spreads decreased significantly following the MPC announcement on this day.
- (d) The ICPF category includes pension funds, insurers, and liability-driven investment asset managers.
- (e) Several other sectors are not shown, including the Bank of England's Asset Purchase Facility and the Debt Management Office.

In the week beginning 9 March, many NBFIs were net sellers of gilts – a sharp reversal of their behaviour in the 'flight to safety' period (Chart 3.5). On aggregate, ICPFs and asset managers sold net gilts worth around £6 billion during the 'dash for cash'. Duffie (2020) documents that the foreign official sector had a significant demand for liquidity in the US Treasury markets. While we find similar evidence that foreign official sales of gilts were significantly elevated relative to normal levels, in contrast to US findings they appear to have been a less significant factor in aggregate net sales, selling approximately £1 billion of gilts, in addition to the net sales by ICPFs mentioned above.

Dealers and hedge funds continued to purchase gilts during this period, as they had in the preceding 'flight to safety' period. The role of hedge funds in the US Treasury market has been written about extensively (see, for example, Schrimpf et al (2020)). They find evidence in the US Treasury market of forced selling of Treasury securities by leveraged investors who had attempted to exploit small yield differences through the use of leverage. While this dynamic may have been at play in the UK gilt market for individual hedge funds, contributing to selling pressure, we find little evidence for this behaviour as an aggregate sector. Rather, the hedge fund sector accumulated gilts in both the 'flight to safety' and 'dash for cash' periods.[5]

The Bank of England also reinvested cash flows from maturing gilts it held as part of its previous quantitative easing programmes. Moreover, the UK's Debt Management Office conducted several gilt issuance auctions during both the 'flight to safety' as well as the 'dash for cash'.[6]

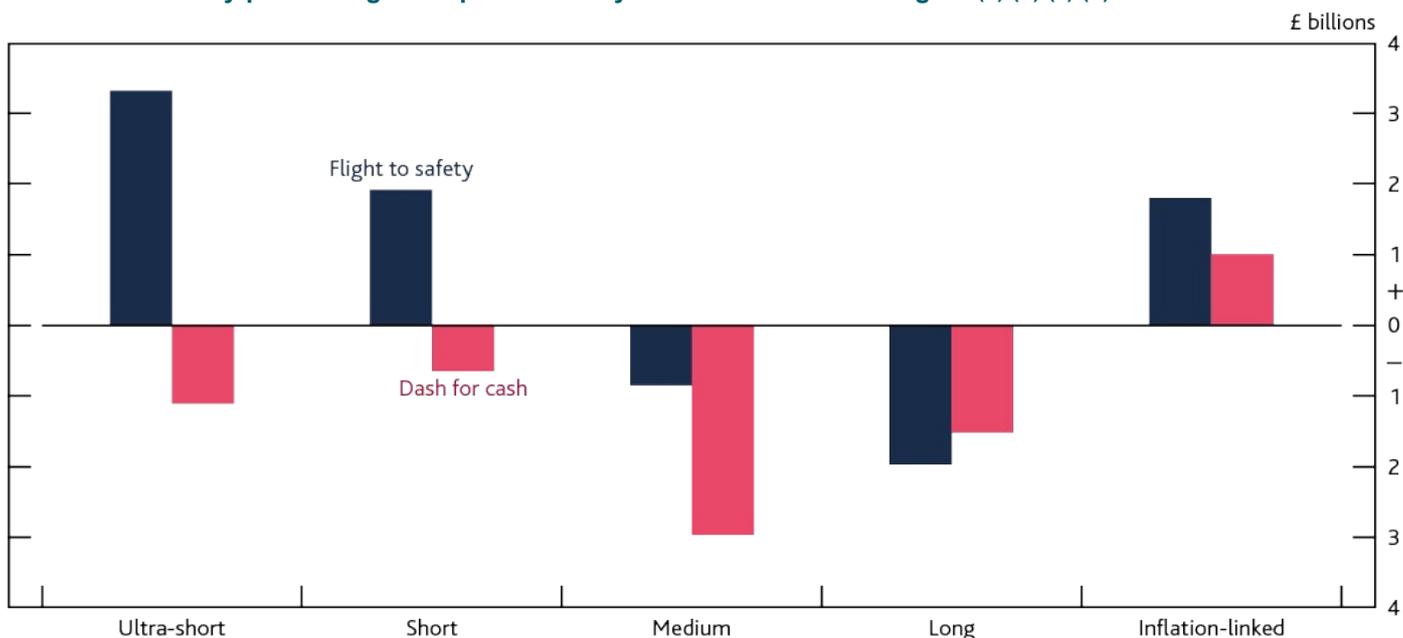
Chart 3.5: Cumulative net purchases of gilts by ICPFs and asset managers (a) (b) (c) (d)


Sources: FCA transaction (MiFID II) data and Bank calculations.

- (a) For all conventional gilts.
- (b) 'Flight to safety' defined as 24 February to 6 March.
- (c) 'Dash for cash' defined as 9–19 March. We end the 'dash for cash' period on 19 March for cash gilts only because yields and bid-ask spreads decreased significantly following the MPC announcement on this day.
- (d) Includes ICPFs (pension funds, insurers, and liability-driven investment asset managers) and asset managers.

ICPFs and asset managers primarily sold gilts across the entire yield curve during the 'dash for cash', in contrast to the 'flight to safety'.

During the 'flight to safety' period, asset managers and ICPFs maintained demand for inflation-linked bonds. ICPFs have a typical demand for these gilts, in order to match their liabilities' sensitivity to changes in inflation. They also purchased ultra-short dated gilts, likely for their use as a cash management tool. During the 'dash for cash', however, ICPFs and asset managers sold bonds across the nominal yield curve – including their holdings of medium and long-dated government bonds (Chart 3.6). This behaviour is consistent with forced or near-forced liquidation of gilts to meet cash demands, as it suggests more indiscriminate selling. These pronounced sell volumes in medium and long-dated gilts from ICPFs, who typically have a preference for holding long-dated bonds, may have contributed to the sharp increase in longer maturity gilt yields (Chart 3.1). ICPFs continued to purchase inflation-linked bonds, although on a smaller scale compared to the 'flight to safety' period.

Chart 3.6: Maturity profile of gilt net purchases by ICPFs and asset managers (a) (b) (c) (d)


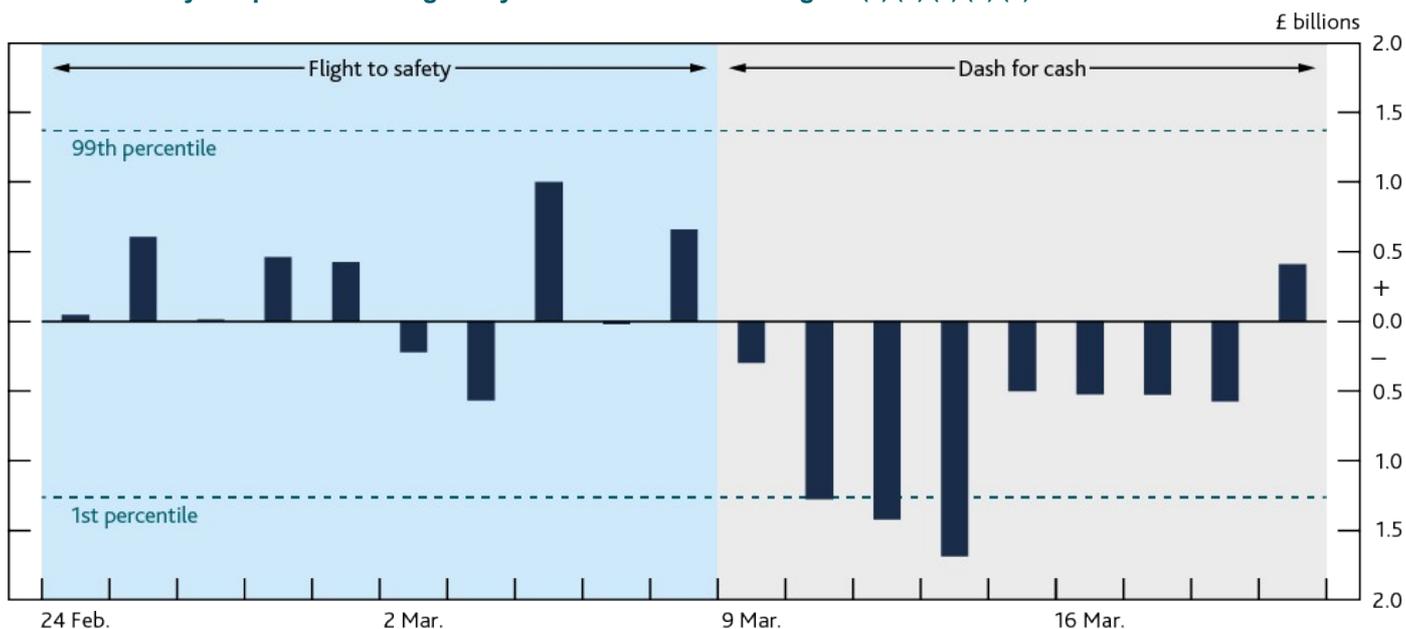
Sources: FCA transaction (MiFID II) data and Bank calculations.

- (a) 'Flight to safety' defined as 24 February to 6 March.
- (b) 'Dash for cash' defined as 9–19 March. We end the 'dash for cash' period on 19 March for cash gilts only because yields and bid-ask spreads decreased significantly following the MPC announcement on this day.
- (c) Ultra-short maturity gilts are those with residual maturity of less than three years; short maturity gilts are those with a residual maturity of three to seven years; medium are those with a residual maturity of seven to fifteen years and long are those with a residual maturity of more than fifteen years.
- (d) Includes ICPFs (pension funds, insurers, and liability-driven investment asset managers) and asset managers.

Overall, NBFI order imbalances were one-sided and large relative to historical flows.

During the 'dash for cash' period, ICPFs and asset managers not only reversed their previous net purchases, but also became net sellers of gilts in volumes which were very high by historical standards.

Chart 3.7 shows the daily net sales by ICPFs and asset managers over the period. These net sales were very large on a historical basis, with several consecutive days of net sales falling below the 1st percentile of the historic distribution. Dealers' purchases from ICPFs and asset managers alone exceeded the 90th percentile of the historic distribution of dealers' net purchases from all sectors.

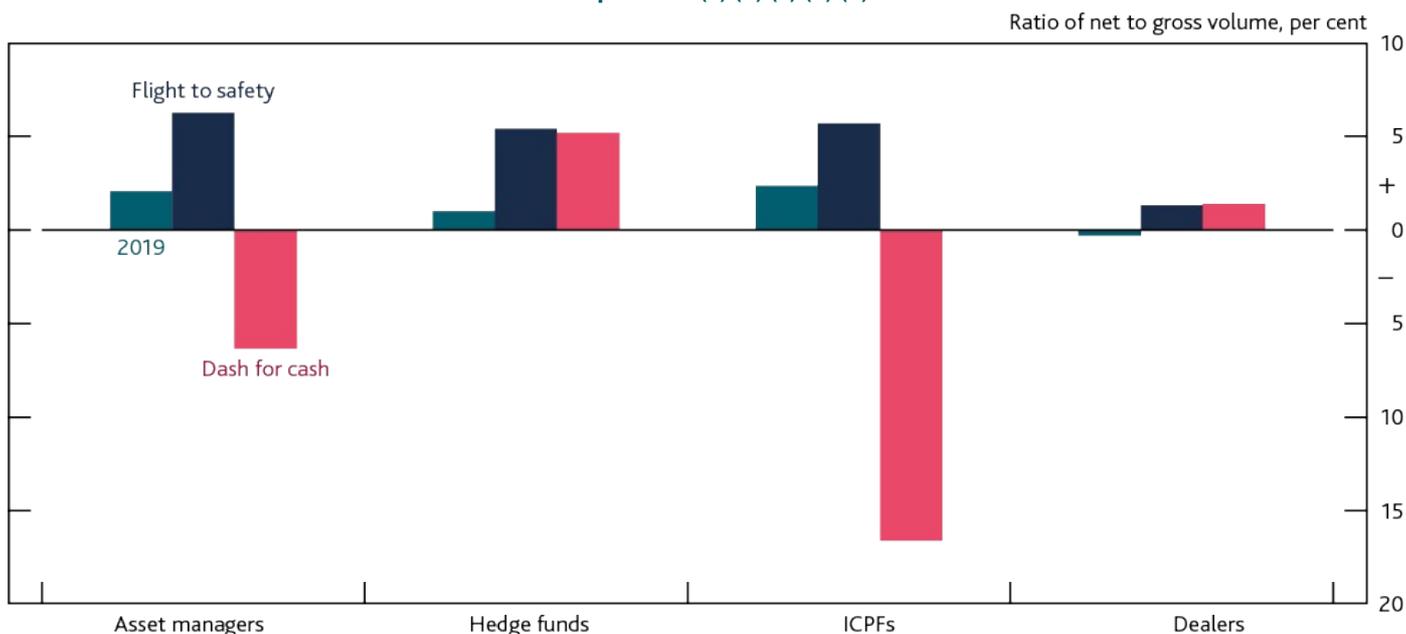
Chart 3.7: Daily net purchases of gilts by ICPFs and asset managers (a) (b) (c) (d) (e)


Sources: FCA transaction (MiFID II) data and Bank calculations.

- (a) For all conventional gilts.
- (b) 'Flight to safety' defined as 24 February to 6 March.
- (c) 'Dash for cash' defined as 9–19 March. We end the 'dash for cash' period on 19 March for cash gilts only because yields and bid-ask spreads decreased significantly following the MPC announcement on this day.
- (d) Includes ICPFs (pension funds, insurers, and liability-driven investment asset managers) and asset managers.
- (e) Percentiles of daily net purchases calculated using gilt transactions from 3 January 2018 to 19 March 2020.

Chart 3.8 shows the NBF1 order imbalances – the net buying/selling relative to gross volumes – during this period in comparison to the average order imbalances in 2019, as well as during the 'flight to safety'. The chart emphasises the large order imbalances and one-sidedness of the market during the 'dash for cash', largely driven by the substantial net sales of ICPFs and asset managers.

In particular, ICPFs sold (on net terms) almost 20% of their gross volume during this period. Similarly, asset managers sold on net terms 7% of their gross volumes.

Chart 3.8: NBFi order imbalance over selected periods (a) (b) (c) (d) (e)


Sources: FCA transaction (MiFID II) data and Bank calculations.

- (a) For all conventional gilts.
- (b) 'Flight to safety' defined as 24 February to 6 March.
- (c) 'Dash for cash' defined as 9–19 March. We end the 'dash for cash' period on 19 March for cash gilts only because yields and bid-ask spreads decreased significantly following the MPC announcement on this day.
- (d) The ICPF category includes pension funds, insurers, and liability-driven investment asset managers.
- (e) Order imbalance defined as net purchases/gross volume by each investor group. It is therefore bound between -100% and 100% (see, eg, Brandt and Kavajecz (2004)).

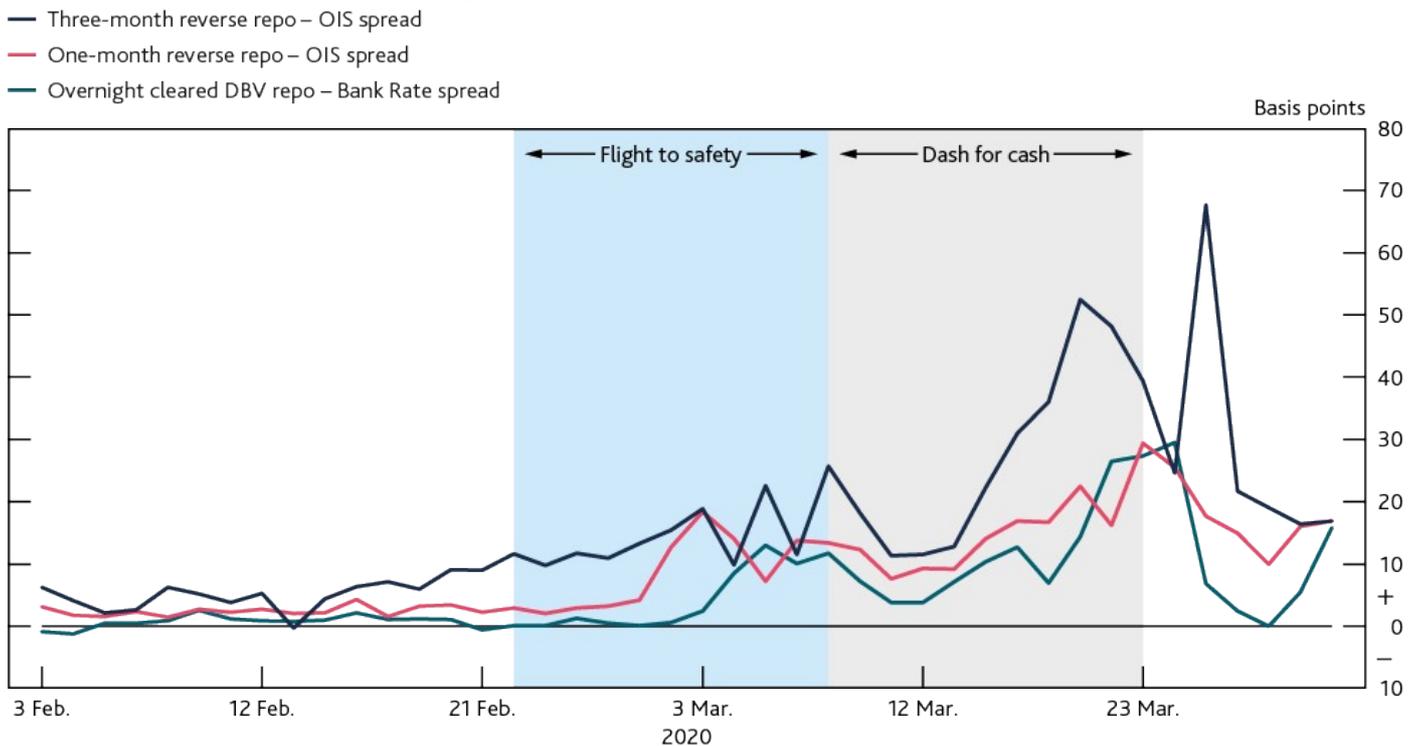
3.2: How did NBFIs behave in the gilt repo market?

The gilt repo market allows financial institutions to borrow cash by selling gilts and agreeing to repurchase them at a later date. This means gilt repos effectively function as secured loans, with gilts being used as collateral to borrow cash against. Box A provides further detail on the gilt repo market, and its importance for the NBFi sector.[7]

The 'dash for cash' in the gilt repo market was characterised by higher repo rates and market dysfunction.[8]

Having functioned well during the 'flight to safety' and at the start of the 'dash for cash', market functioning in both the overnight and longer maturity market (ie borrowing or lending cash for more than one day, also referred to as 'term repo') segments of gilt repo deteriorated later on in the 'dash for cash'. Term gilt repo rates began to rise sharply in mid-March (Chart 3.9) and market intelligence suggests that the longer maturity section of the market was highly illiquid at the time. As the 'dash for cash' intensified, overnight gilt repo rates became similarly affected; the spread between overnight repo rates and the official Bank Rate began to widen substantially from 19 March and peaked at around 30 basis points on 24 March.

Chart 3.9: Gilt repo rates over the ‘flight to safety’ and ‘dash for cash’ periods (a) (b) (c)



Sources: Bank of England Sterling Money Market data collection, Bloomberg Finance L.P. and Bank calculations.

- (a) Repo and reverse repo in the chart above are defined from the perspective of the dealer, where a repo trade is a dealer borrowing cash from a counterparty and a reverse repo trade is a dealer lending cash to a counterparty.
- (b) The overnight cleared DBV repo – Bank Rate spread is a volume-weighted average of cleared DBV (general collateral) repo and reverse repo trades as a spread to Bank Rate.
- (c) One-month/three-month reverse repo – OIS spreads are volume-weighted averages of reverse repo trades (including all DBV types) as a spread to the corresponding OIS rates.

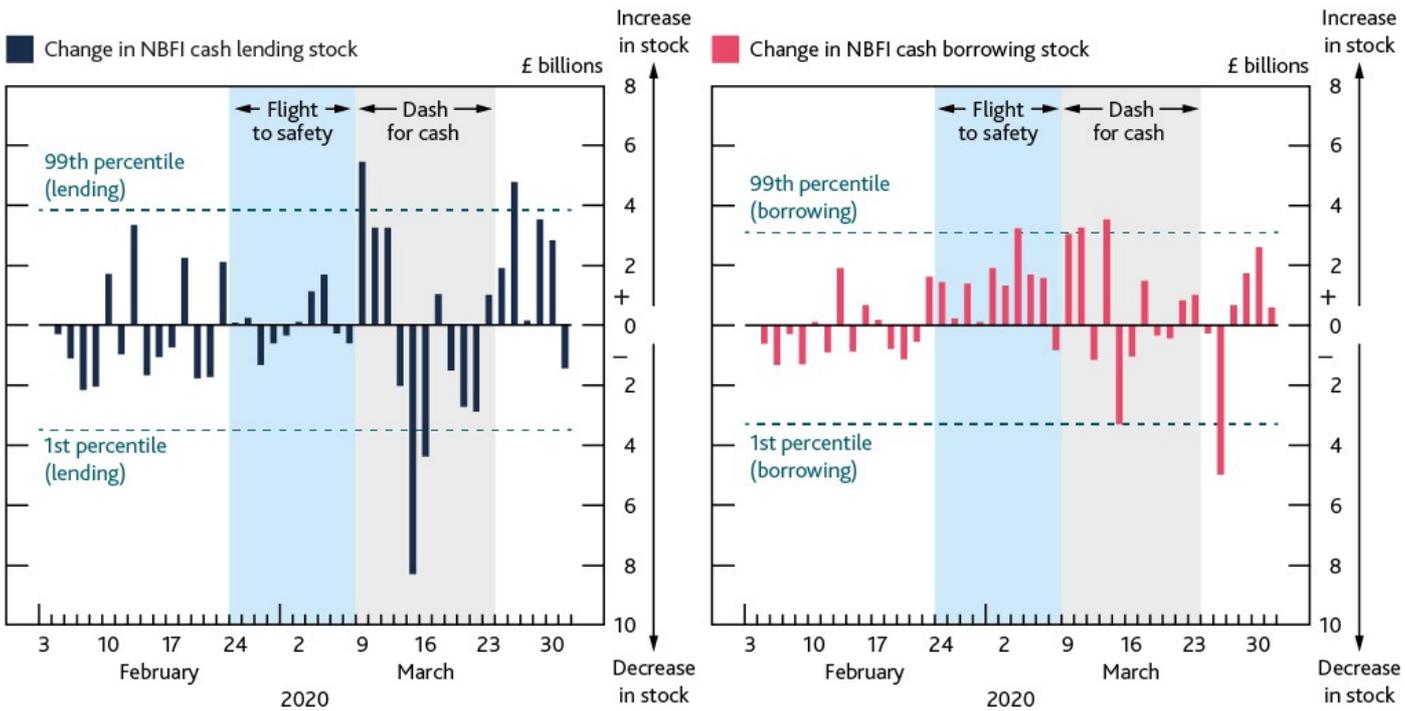
NBFIs sharply increased their borrowing and lending in the gilt repo market at the start of this period...

During the ‘flight to safety’ and initial part of the ‘dash for cash’ periods, NBFIs increased their cash borrowing. The sector did so at a very fast pace relative to historical moves, with some daily increases larger than the 99th percentile of daily moves in the historical distribution (Chart 3.10, Panel 2).^[9] This persistent rise in cash borrowing led to a peak cumulative increase in the stock of cash borrowing equivalent to 6% of the average amount outstanding over 2019 (Chart 3.11), or £16 billion. NBFIs cash lending in gilt repo also increased markedly at the beginning of the ‘dash for cash’ (Chart 3.10, Panel 1). Taken together, these increases in both gross borrowing and lending represented a very fast expansion in NBFIs’ demand for intermediation of repo funds.

Chart 3.10: Daily changes in the stock of non-bank cash lending and borrowing over the ‘flight to safety’ and ‘dash for cash’ periods (a)

Panel 1: Change in NBFi cash lending stock

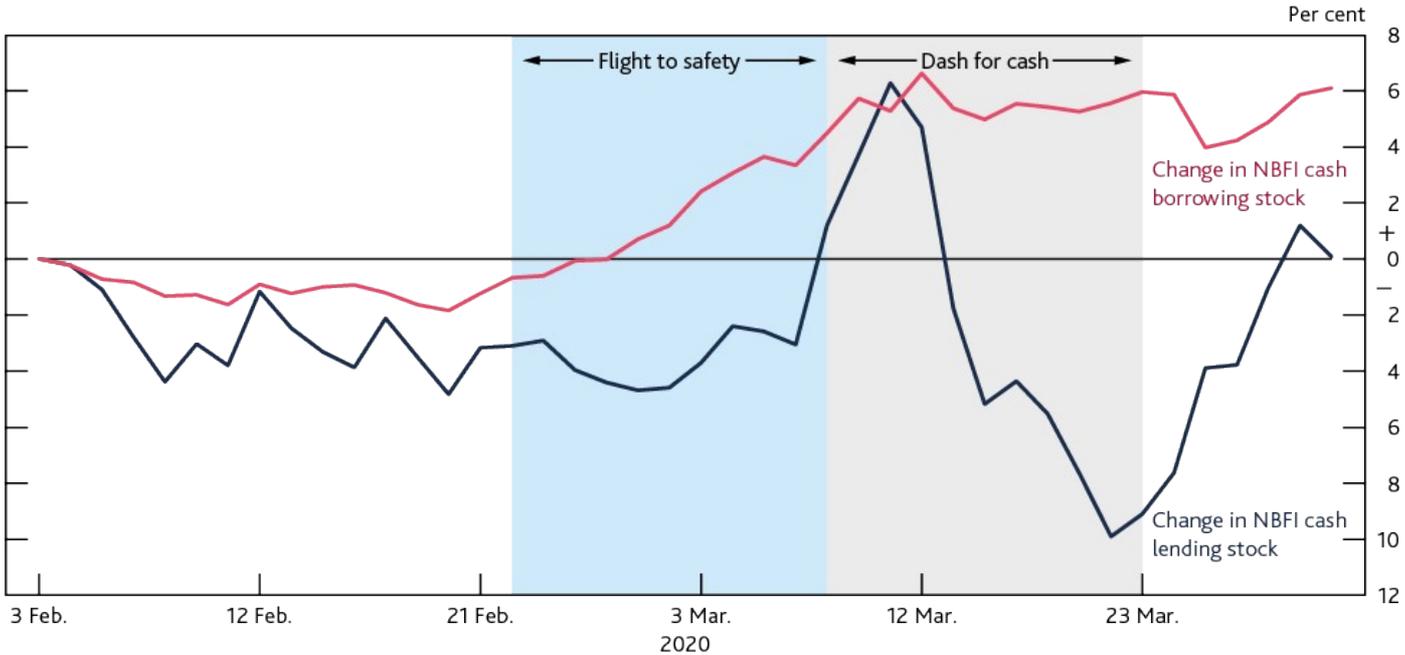
Panel 2: Change in NBFi cash borrowing stock



Sources: Bank of England Sterling Money Market data collection and Bank calculations.

(a) The 1st and 99th percentiles of daily changes in the stock of non-bank cash lending and borrowing are calculated over the period 1 July 2017 to 23 February 2020.

Chart 3.11: Cumulative change in non-bank gilt repo borrowing and lending over the ‘flight to safety’ and ‘dash for cash’ periods as a proportion of the average amount outstanding in 2019 (a)



Sources: Bank of England Sterling Money Market data collection and Bank calculations.

(a) Changes are calculated relative to the average stock of cash lending and borrowing of non-banks over 2019. For cash lending this figure was £128.2 billion, and for lending the figure was £265.0 billion. See Box A for more details.

...and then abruptly reduced their gross and net repo lending during the ‘dash for cash’.

Following the expansion in gilt repo borrowing and lending by NBFIs, their lending then contracted sharply over the ‘dash for cash’. The quantity of funds withdrawn by NBFIs over this period were very large compared to the historical distribution. In particular, the £8 billion contraction in the cash lending stock on 13 March was the largest daily move on record (Chart 3.10, Panel 1).^[10] From the peak in cash lending on 11 March to the trough on 20 March, the cumulative fall in NBFi cash lending stock in gilt repo was just over £20 billion. This contraction was equivalent to approximately 16% of the size of the average lending amount outstanding in 2019 (Chart 3.11). The contraction in lending, coupled with the increased demand for borrowing by NBFIs, meant the NBFi sector as a whole drove a reduction in net cash provision in the repo market over the ‘dash for cash’.

The remainder of this section examines in more detail how the actions of specific NBFi sectors – in particular MMFs and some leveraged investors – contributed to the seizing-up of term gilt repo and the widening of spreads in the overnight market.

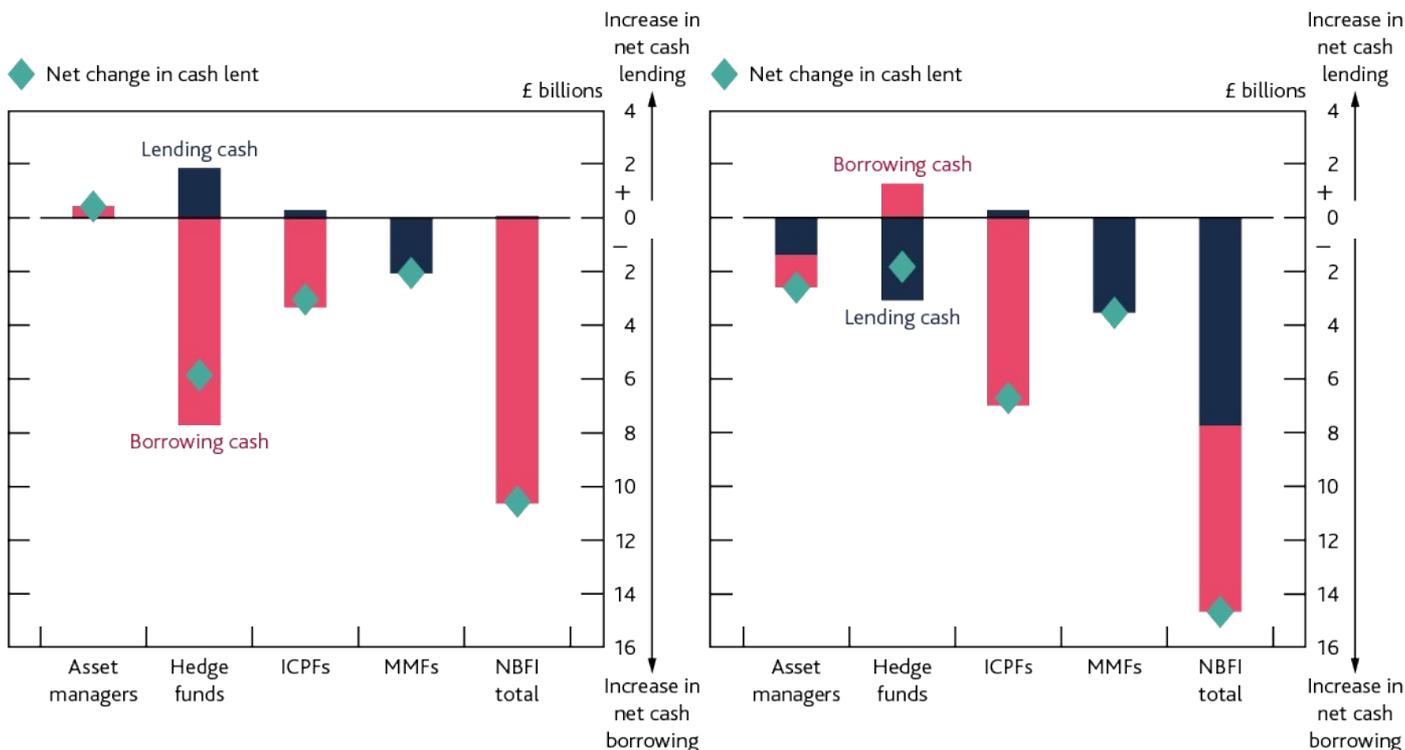
ICPFs and hedge funds increased their gilt repo borrowing during the ‘flight to safety’ and early on in the ‘dash for cash’...

During the ‘flight to safety’ period, the majority of ICPFs increased their term gilt repo borrowing.^[11] The sector likely took this action to raise cash so that they could hedge their liabilities as gilt yields fell, as outlined in the previous section. Hedge funds also increased their borrowing by around £8 billion during this period, predominantly in the medium maturity section of the market. Market intelligence suggests that this was possibly as a means of funding long positions in sovereign bonds, to profit from falling yields. Over the same period, hedge funds increased their lending by approximately £2 billion, giving a net borrowing figure over the ‘flight to safety’ of around £6 billion. MMFs reduced their net lending by approximately £2 billion over the ‘flight to safety’ period (Chart 3.12, Panel 1). In total, the steady rise in the borrowing of ICPFs and hedge funds over the ‘flight to safety’ period led to a cumulative net cash demand from NBFIs of around £10.5 billion by 6 March.

Chart 3.12: Change in gilt repo borrowing and lending by non-banks over the ‘flight to safety’ and ‘dash for cash’ periods (a) (b)

Panel 1: Change in NBFi net lending over ‘flight to safety’

Panel 2: Change in NBFi net lending over ‘dash for cash’



Sources: Bank of England Sterling Money Market data collection and Bank calculations.

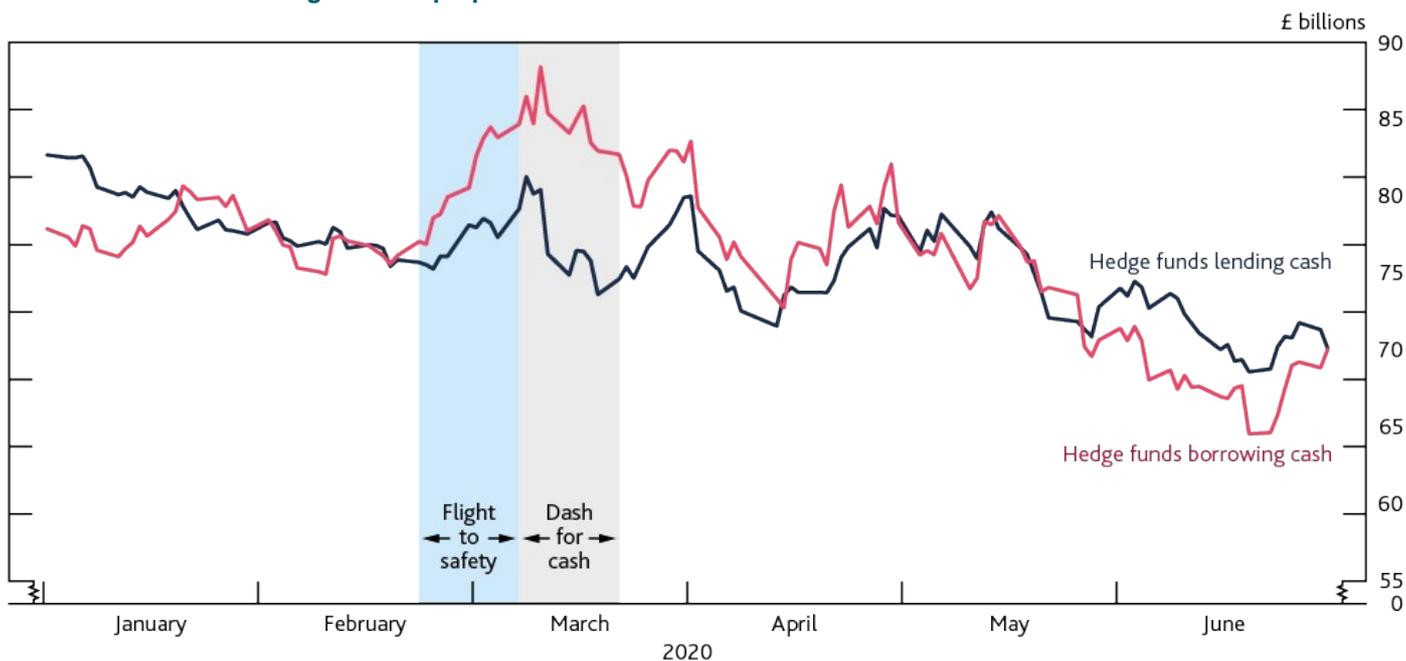
- (a) Positive values indicate a rise in the case of cash lending and a fall in the case of cash borrowing.
- (b) Negative values indicate a fall in the case of cash lending and a rise in the case of cash borrowing.

...but, despite higher rate volatility, the gilt repo market remained functional throughout this period.

While term gilt repo rates became more volatile (particularly three-month rates), there was not a large increase in the level of rates over the ‘flight to safety’ period (Chart 3.9), despite the heightened demand for borrowing from NBFIs. Moreover, both term and overnight gilt repo volumes stayed within normal ranges. This evidence, coupled with market intelligence, suggests that the gilt repo market remained functional over the ‘flight to safety’ period.

Gilt repo market functioning became impaired once MMFs reduced their repo lending.

The sharp contraction in NBFi cash lending starting from 12 March (Chart 3.11) was largely driven by MMFs withdrawing funds from the overnight market (Chart 3.12, Panel 2). Moreover, during the period of market stress, ICPFs continued to increase their demand for term borrowing (increasing their stock of cash borrowing by an additional £7 billion during the ‘dash for cash’). In contrast, although gross lending by hedge funds fell by around £3 billion over the ‘dash for cash’ period, this was partially offset by a reduction in their borrowing (as shown in Charts 3.12 (Panel 2) and 3.13, the latter as a time-series). In total, there was an £8 billion reduction in lending from the NBFi sector between 9–23 March.

Chart 3.13: Stock of hedge fund repo positions over 2020 H1


Sources: Bank of England Sterling Money Market data collection and Bank calculations.

Over this period, the flow of term gilt repo fell, despite ICPFs continuing to demand higher term borrowing. Moreover, the spread of three-month gilt reverse repo to Overnight Index Swap (OIS) spiked to almost 70 basis points. Functioning in the overnight segment of the gilt repo market also became impaired during the peak of the 'dash for cash', with the overnight repo rate decoupling from Bank Rate, as shown in Chart 3.9.

3.3: What were the consequences of NBFIs' behaviour in these markets?

In the cash gilt market, NBFIs' increased gross trading and one-sided selling contributed to dealers being overwhelmed and to market dysfunction.

In the cash gilt market, heightened gross trading and net selling by the NBFIs sector meant that, over the 'dash for cash' period, the sector as a whole demanded a significant increase in intermediation by dealers. In addition, dealers may have faced constraints to gilt intermediation, including those arising from internal risk controls, regulations to safeguard the core banking system, and the operational challenges of moving to remote working arrangements. As a result, the demand for intermediation outstripped dealers' ability and willingness to intermediate. The speed and size of these sales contributed to a widening of bid-ask spreads and a sharp rise in gilt yields from 9 March onwards.

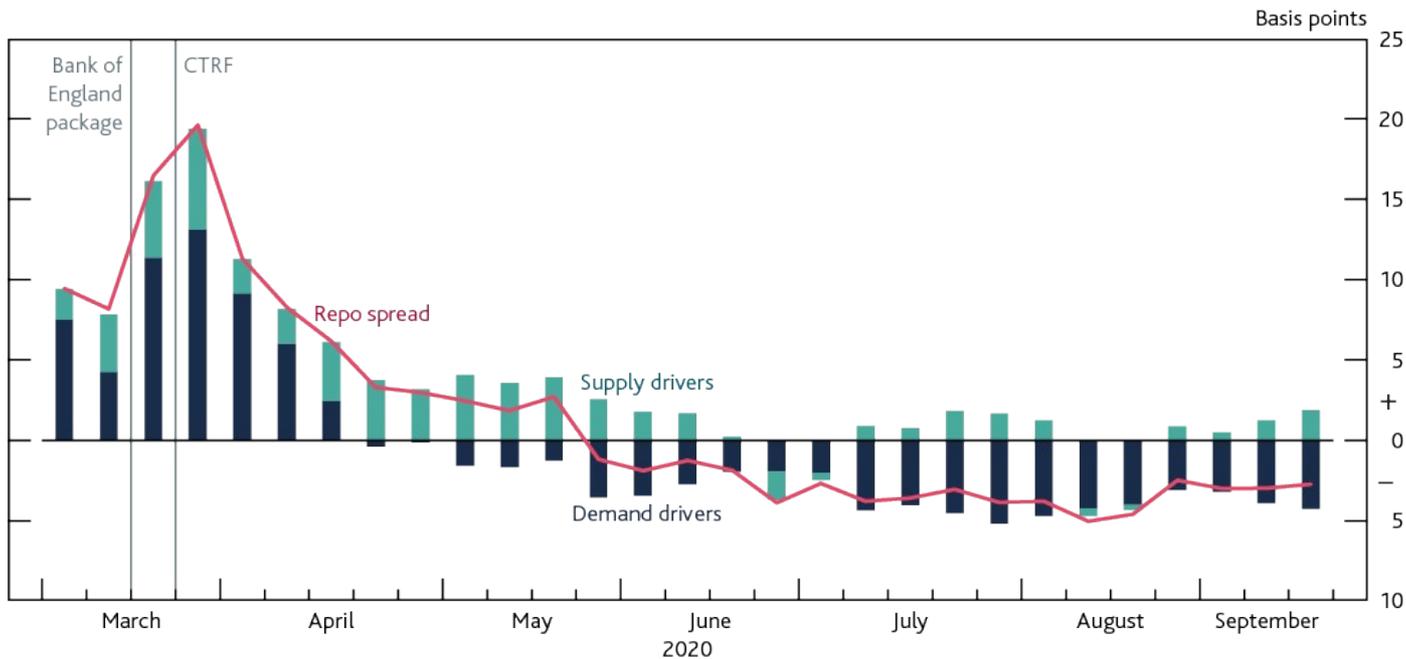
In gilt repo markets, NBFIs actions sharply increased the demand for dealer intermediation, at a time where dealers were facing balance sheet constraints.

In gilt repo markets, NBFIs (eg MMFs) are key providers of repo lending to dealers, as well as large borrowers (eg hedge funds and ICPFs). During the Covid stress period, NBFIs simultaneously reduced cash lending and increased cash borrowing in the gilt repo market. Overall, NBFIs actions during the 'dash for cash' reduced the availability of short-term funds from gilt repo markets by around £15 billion on net (Chart 3.12, Panel 2). Since dealers rely on borrowing cash in repo markets to fund their repo lending, such a large and rapid withdrawal of short-term funds by NBFIs is likely to have impacted dealers' ability to extend repo lending. In addition, dealers had expanded their repo balances during earlier stages of the stress – including to meet NBFIs' increased demand for repo borrowing. As a result, the withdrawal of repo funds might have coincided with dealers facing increased balance sheet constraints.

This contributed to extremely elevated rates at both overnight and term maturities in gilt repo and a drying up in volumes in the term market.

NBFIs actions, combined with dealers' intermediation constraints, led to the price of overnight gilt repo decoupling from Bank Rate (Chart 3.9). Both increased demand for, and limited supply of gilt repo intermediation by dealers, are likely to have played a role in the spread widening. For one-month repo, for instance, Chart 3.14 shows that around two thirds of peak spreads were driven by demand factors.[12]

Chart 3.14: Cumulative change in repo spread from February average, split into liquidity demand/supply drivers (a) (b) (c)



Sources: Bank of England Sterling Money Market data collection, Bloomberg Finance L.P. and Bank calculations.

- (a) Based on a historical decomposition from an SVAR model with sign restrictions. See Noss and Patel (2019) for more detail.
- (b) Repo spread is the one-month gilt reverse repo-OIS spread.
- (c) Bank of England package refers to the 19 March announcement of increased bond holdings.

Moreover, stress in gilt repo markets likely exacerbated dysfunction in the cash gilt market. This is because dysfunction in gilt repo markets may have impacted dealers' and hedge funds' ability to intermediate and/or to purchase gilts, given that they rely on gilt repo to fund those positions.

The Bank of England's interventions managed to restore market functioning.

On 19 March, the Monetary Policy Committee (MPC) of the Bank of England voted unanimously to increase the holdings of UK government bonds (by approximately £13 billion a week) and sterling non-financial investment-grade corporate bonds, financed by the issuance of central bank reserves; and to reduce Bank Rate by 15 basis points to 0.1%. On 24 March, the Bank of England activated the Contingent Term Repo Facility (CTRF), which allowed participants to borrow central bank reserves (cash) in exchange for collateral.[13] These interventions managed to restore confidence by reducing concerns about market functioning. Financial conditions remained tight, however, and continued interventions were necessary to support businesses and households through the crisis, and limit any lasting damage to the economy.

4: Liquidity demands faced by NBFIs

While the analysis in the previous chapter has focused on how the NBFi sector sought to raise cash in gilt and repo markets, we now turn our attention towards the drivers of these liquidity needs. In particular, our granular data allow us to quantify the magnitude of margin demands on derivative positions as well as redemptions from MMFs and OEFs.

4.1: What do we know about the effect of margin calls on NBFIs?

The collection of margin is a crucial safeguard in financial markets by ensuring that derivatives exposures are adequately capitalised as prices change and volatility rises. Derivative users post collateral to cover both current counterparty exposures and potential future exposures, thereby reducing the risk that the failure of one counterparty causes losses or defaults for other counterparties and therefore systemic problems. Derivative users are required to settle changes in the market value of the trade at least once a day via variation margin (VM). Initial margin (IM) is posted to cover the loss that could incur between the default of a counterparty and the closing-out of a position, and is recalculated on a regular basis.

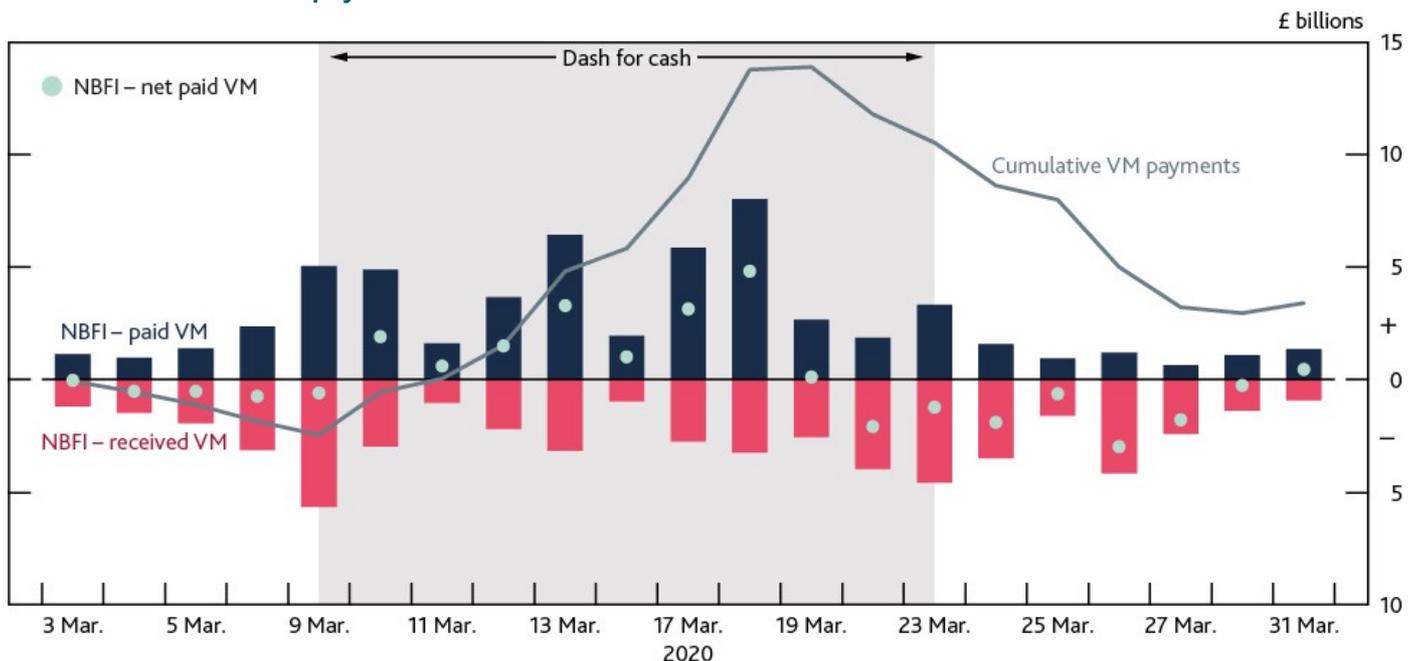
Gross and net flows of VM paid by NBFIs were substantial...

Investors faced large VM calls on their cleared and uncleared derivative exposures, reflecting changes in the actual market value of the contracts. The NBFi sector in particular was paying significantly larger volumes of VM than it was receiving. For example, a range of pension funds, insurers and investment funds had to meet large VM calls on their interest rate and currency hedging exposures.

...but they are likely to have increased most sharply once the ‘dash for cash’ period had already started.

While remaining subdued in early March, VM calls increased sharply once the ‘dash for cash’ period had begun (Chart 4.1).^[14] Starting from 10 March, NBFIs faced daily estimated net VM calls of up to £5 billion. In total, the cumulative net VM payments of NBFIs amounted to more than £12 billion during the ‘dash for cash’. Behind these net numbers lie larger margin payments made by some NBFIs, offset by margin payments received by others. To provide a historic comparison, daily VM calls reached up to 5.6 times the January average (in the case of clearing members’ client accounts at UK central counterparties (CCPs)). Towards the end of the ‘dash for cash’, NBFIs started to receive larger volumes of VM than they were paying as market conditions began to improve.

Chart 4.1: Estimated VM payments for UK NBFIs



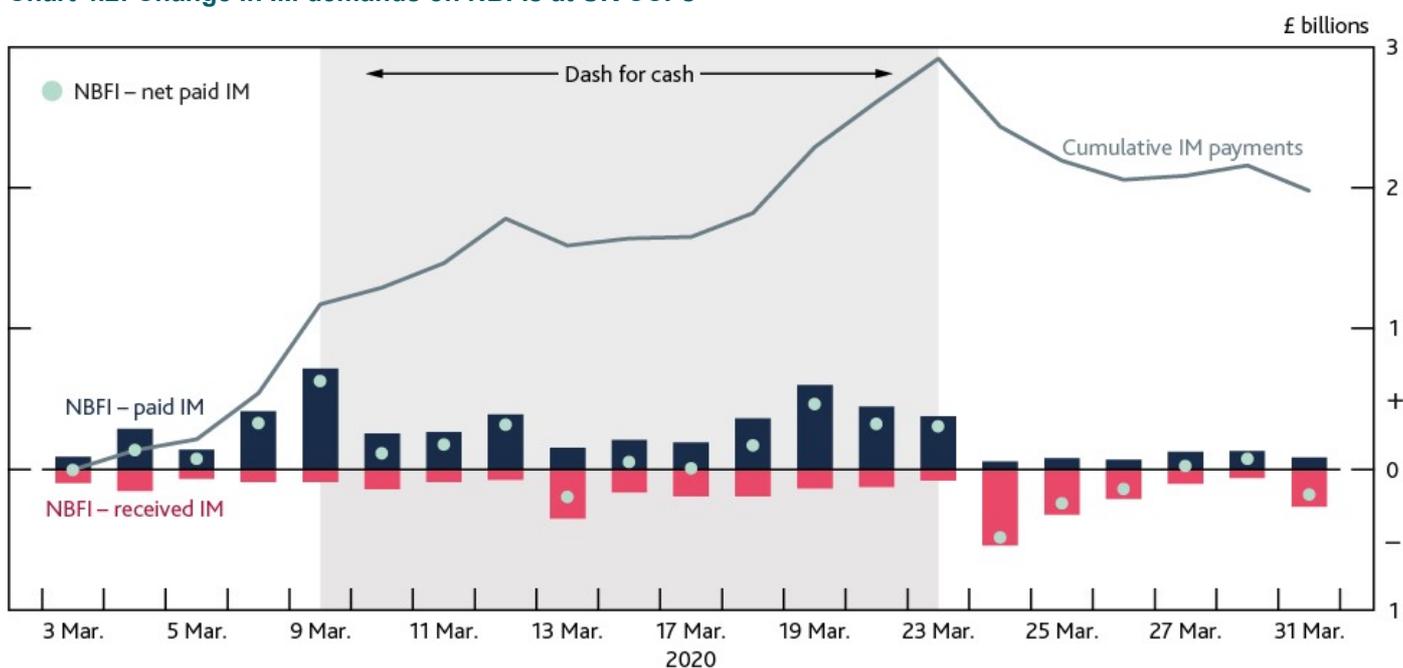
Sources: EMIR Trade Repository Data and Bank calculations.

IM posted by NBFIs increased significantly as market volatility rose and NBFIs extended their derivatives positions.

IM requirements typically adjust in a predictable and gradual way in response to changes in market conditions and thus do not result in daily margin calls on the same scale as for VM. Nevertheless, the sharp increase in volatility during the ‘flight to safety’ period (24 February – 6 March) meant that IM demands on NBFIs started to mount on both cleared and uncleared derivatives, reflecting the forward-looking nature of IM. Moreover, some NBFIs extended their derivatives positions during this period, leading to further IM demands.

The changes in IM demands on NBFIs at UK CCPs reached a total of around £1.2 billion during the ‘flight to safety’ period. The IM pressure continued to build during the ‘dash for cash’ period, when NBFIs had to post another £2.4 billion in IM (Chart 4.2).[15] Following a sharp drop in market volatility in late March, IM demands on NBFIs were significantly reduced. On 24 March, for example, IM demands on NBFIs decreased by around £0.5 billion as market conditions improved.

Chart 4.2: Change in IM demands on NBFIs at UK CCPs



Sources: Supervisory returns and Bank calculations.

NBFIs had to meet these liquidity needs by going through their waterfall of liquid assets...

To meet these significant margin calls, the NBFIs sought cash, and so turned to gilt repo markets, redeemed their assets in MMFs or OEFs, drew on bank credit lines, and sold non-cash assets. Furthermore, this also meant that investors stopped investing incoming cash in credit or equity markets. Insurers, for example, stopped investing inflows of insurance premia.

...selling risky assets, such as their most liquid corporate bonds...

NBFIs began to sell-off their risky assets to meet the substantial liquidity needs. For example, Chart 4.6 shows that asset managers sold large quantities in the corporate bond market in response to investor redemptions, with sell volumes of around £300 million in the ‘flight to safety’ period and an additional £2.5 billion during the ‘dash for cash’. Moreover, some funds had to meet margin calls on their derivative exposures, adding further pressure on their liquid asset holdings.

...but also gilts, likely contributing to the offsetting of ‘flight to safety’ trades and ultimately the ‘dash for cash’.

When NBFIs faced increased liquidity demands in early to mid-March, they also started to sell-off safe assets such as gilts. The net gilt sales of more than £6 billion by asset managers and ICPFs offset ‘flight to safety’ trades of other investors and ultimately contributed to the ‘dash for cash’ (Chart 3.5).

Starting in mid-March, NBFIs also withdrew their shares from sterling MMFs and OEFs to obtain additional funding liquidity. These severe redemptions are discussed in more detail below.

4.2: What do we know about redemptions from money market funds?

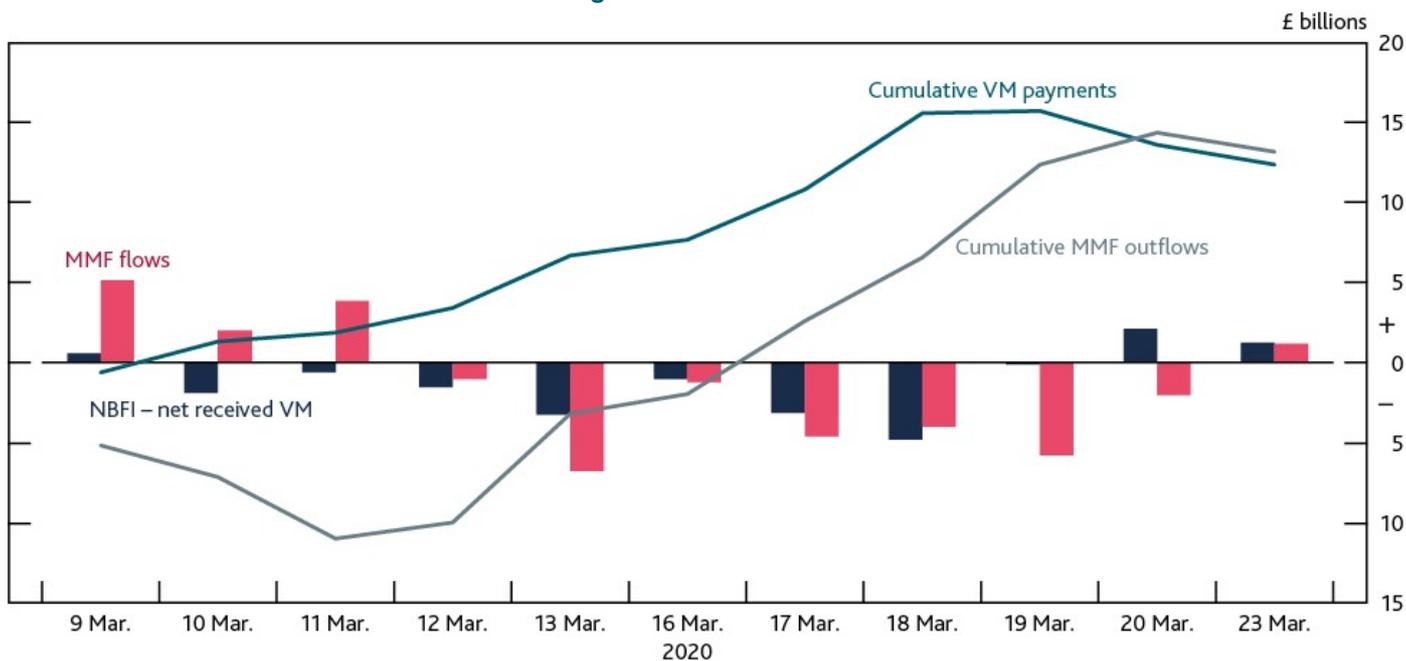
Money market funds (MMFs) are used by a wide variety of investors as part of their cash management strategies as alternatives or complements to bank deposits. Investors in MMFs include non-financial corporations, public authorities, ICPFs, asset managers and households. MMFs invest in short-term money market instruments and are key providers of short-term funding to financial institutions (particularly banks), corporates and governments.

Sterling MMF redemptions began on 12 March, after the start of the ‘dash for cash’...

Strikingly, MMFs first saw large aggregate inflows of more than £16.5 billion in early March, including the first few days of the ‘dash for cash’. In the days between 12 March and 20 March, however, MMFs suffered large and prolonged average daily outflows of £3.6 billion – in total more than £25 billion (Chart 4.3). These outflows were extremely large compared to previously observed MMF flows, often falling below the 1st percentile of the historic distribution (Chart 4.4). The cumulative outflows from MMFs during the entire ‘dash for cash’ period amounted to around £13 billion.

Chart 4.3 shows that VM demands on the NBFFI sector often coincided with MMF redemptions; this high correlation between VM demands and MMF outflows is consistent with the evidence from other jurisdictions (see, eg, European Central Bank (2020)) and market intelligence suggesting that many of the redeeming MMF shareholders were LDI investors facing growing margin calls. It is important to note, however, that the high correlation could also be driven by VM demands and MMF outflows both responding to the same asset price shocks.

Chart 4.3: ‘Dash for cash’ outflows from sterling MMFs and estimated NBFFI VM demands

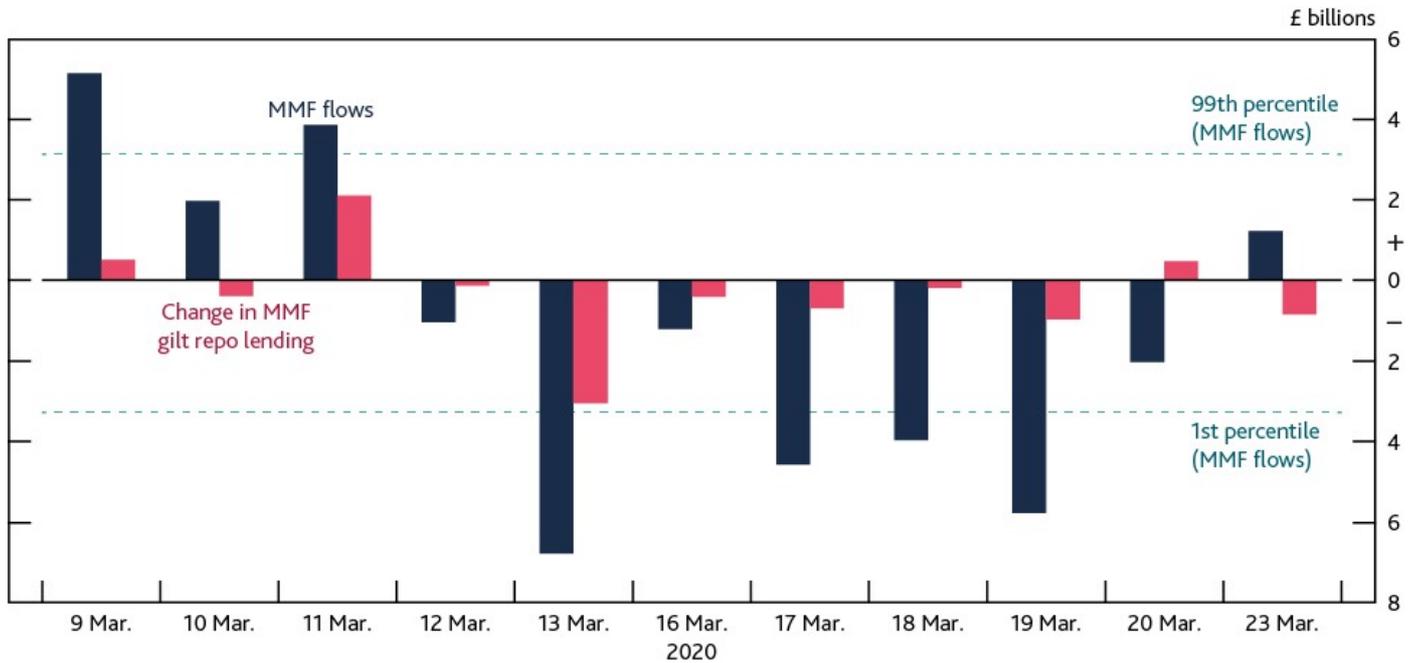


Sources: Crane Data, EMIR Trade Repository Data and Bank calculations.

...and MMFs met their redemptions through a combination of withdrawing funds from gilt repo markets, and selling longer-dated commercial paper (CP) and certificates of deposit (CD)...

MMFs used several liquidity sources to meet these large redemptions. MMFs withdrew a large amount of funds from the gilt repo market, most notably in the overnight segment. The withdrawal of gilt repo funds was correlated with MMF outflows, and on 13 March – on the day of the largest outflows – MMFs reduced their lending in the gilt repo market by more than £3 billion (Chart 4.4). In total, MMFs reduced their gilt repo lending by almost £6 billion in the days between 12 March and 23 March, and by £4 billion during the entire ‘dash for cash’. Furthermore, MMFs sold or matured more than £14 billion of longer-dated CP and CD in March.[16]

Chart 4.4: ‘Dash for cash’ MMF outflows and changes to gilt repo lending (a)



Sources: Bank of England Sterling Money Market data collection, Crane Data and Bank calculations.

(a) The 1st and 99th percentiles of daily MMF flows are calculated over the period 2 January 2014 to 2 November 2020.

...but at times their response exceeded the original redemptions, as MMFs took precautionary actions to increase their liquidity buffers.

On aggregate, the amount raised by MMFs by reducing repo lending, and by selling or maturing CP/CD in March, exceeded the original redemptions of £13 billion during the ‘dash for cash’ period, as MMFs took precautionary actions to increase their liquidity buffers. Importantly, these actions contributed to a dry-up of liquidity in gilt repo and CP markets.

4.3: What do we know about redemptions from open-ended funds?

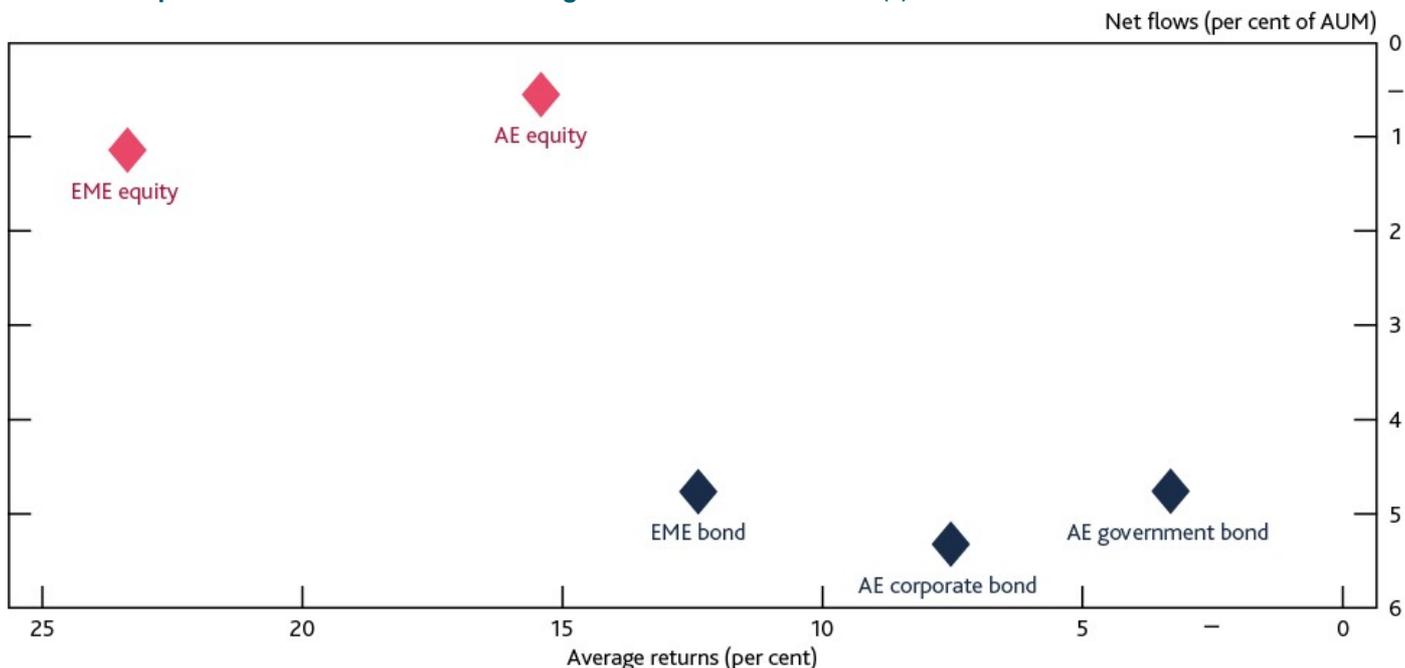
One feature of some open-ended investment funds (OEFs) is liquidity transformation. For example, some OEFs invest in less liquid assets such as corporate bonds, but fund investors can redeem their shares at any time. To meet large investor withdrawals, funds may have to sell illiquid holdings at discounted prices, and the liquidation cost is sometimes borne by the remaining investors. Therefore, under some circumstances investors have an incentive to head to the exit before others, particularly during market downturns. This first-mover advantage is usually more pronounced for OEFs investing in less liquid assets, such as corporate bonds.

Redemptions from fixed-income OEFs started in mid to late February, increasing to 5% of AUM through March...

The activities of OEFs played an important role in the Covid stress period. Outflows at OEFs investing in advanced-economy corporate or government bonds started in mid to late February, and reached around 5% of assets under management (AUM) in March (Chart 4.5). For sterling corporate bond funds, the total redemptions amounted to around £1.4 billion (around 1.3% of their AUM) during March. Importantly, these outflows, which are based on monthly data, likely represent a lower bound for sterling corporate bond fund outflows during the ‘dash for cash’. Daily flow data from a subset of corporate bond funds suggest that funds suffered significantly larger outflows during the ‘dash for cash’, which were partly offset by inflows received during the ‘flight to safety’.[17]

These substantial corporate bond fund outflows stand in stark contrast to the relatively mild outflows at equity OEFs – although equity funds suffered significantly worse average returns. Importantly, the stronger sensitivity of outflows to negative returns for fixed-income funds has also been observed in previous periods (see, for example, Goldstein et al (2017)).

Chart 4.5: Open-ended fund flows and average returns in March 2020 (a)



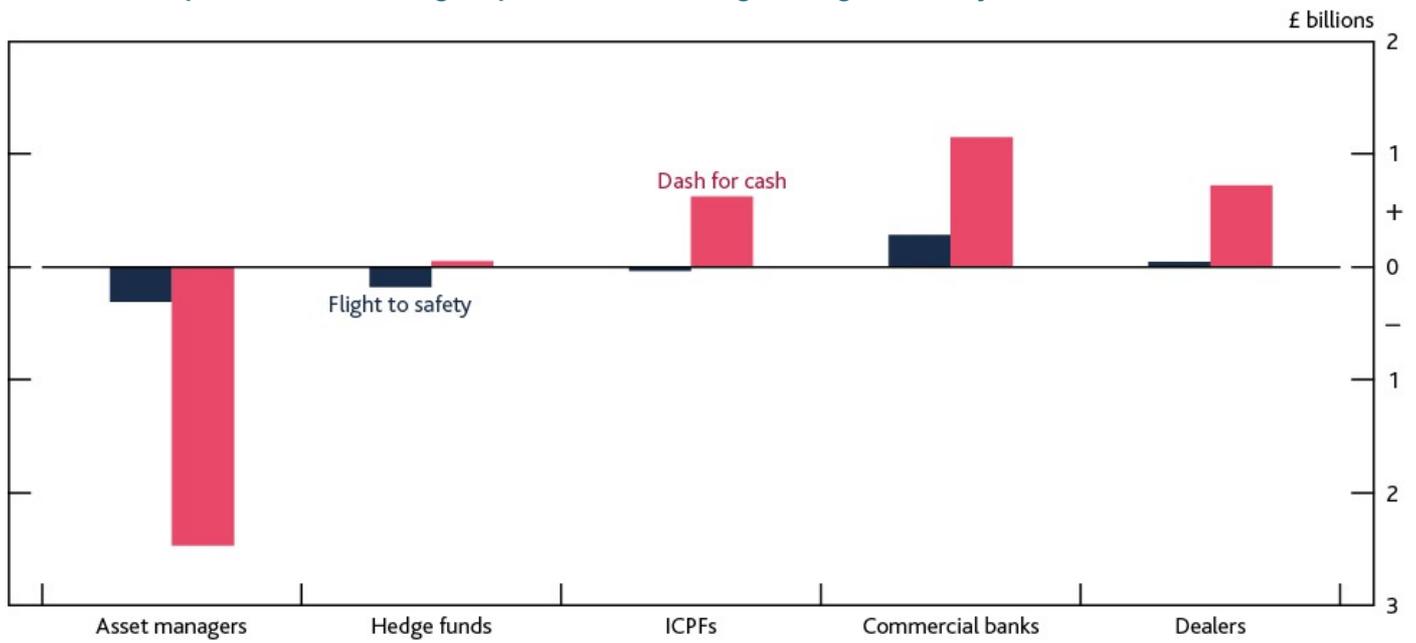
Sources: Morningstar and Bank calculations.

(a) Funds must have at least 30% of their portfolio invested in the asset class (equity, bond, corporate bond or government bond) and region (advanced economies (AE) or emerging market economies (EME)) to be considered as part of each category.

...and OEFs became net sellers of corporate bonds and gilts before the start of the ‘dash for cash’.

The redemptions from OEFs – the largest outflows since the global financial crisis – forced funds to sell large quantities of gilts (see Section 3) and corporate bonds. The net corporate bond sales of the asset management sector started in late February, but significantly increased towards the beginning of the ‘dash for cash’, with a peak daily net sell volume of almost £500 million on 16 March. On aggregate, asset managers sold corporate bonds worth around £2.5 billion during the ‘dash for cash’ alone (Chart 4.6). Furthermore, OEFs also redeemed shares from MMFs, thereby contributing to the large MMF outflows during the ‘dash for cash’.

Chart 4.6: Net purchases of sterling corporate bonds during the ‘flight to safety’ and ‘dash for cash’



Sources: FCA transaction (MIFID II) data and Bank calculations.

5: Mapping the ‘dash for cash’ dynamics in sterling markets

The evidence presented in this paper makes it possible to map liquidity demands across the financial system...

As shown throughout this paper, there is detailed evidence of the nature and magnitude of the liquidity demands faced by NBFIs during the ‘dash for cash’ in sterling markets. And there is also evidence of the responses taken by NBFIs to meet these demands. As a result, it is possible to start quantifying the map shown in Figure 2.1. A stylised quantification of the liquidity demands faced by NBFIs during the ‘dash for cash’ in sterling markets, and of their responses, is provided in Figure 5.1.[18]

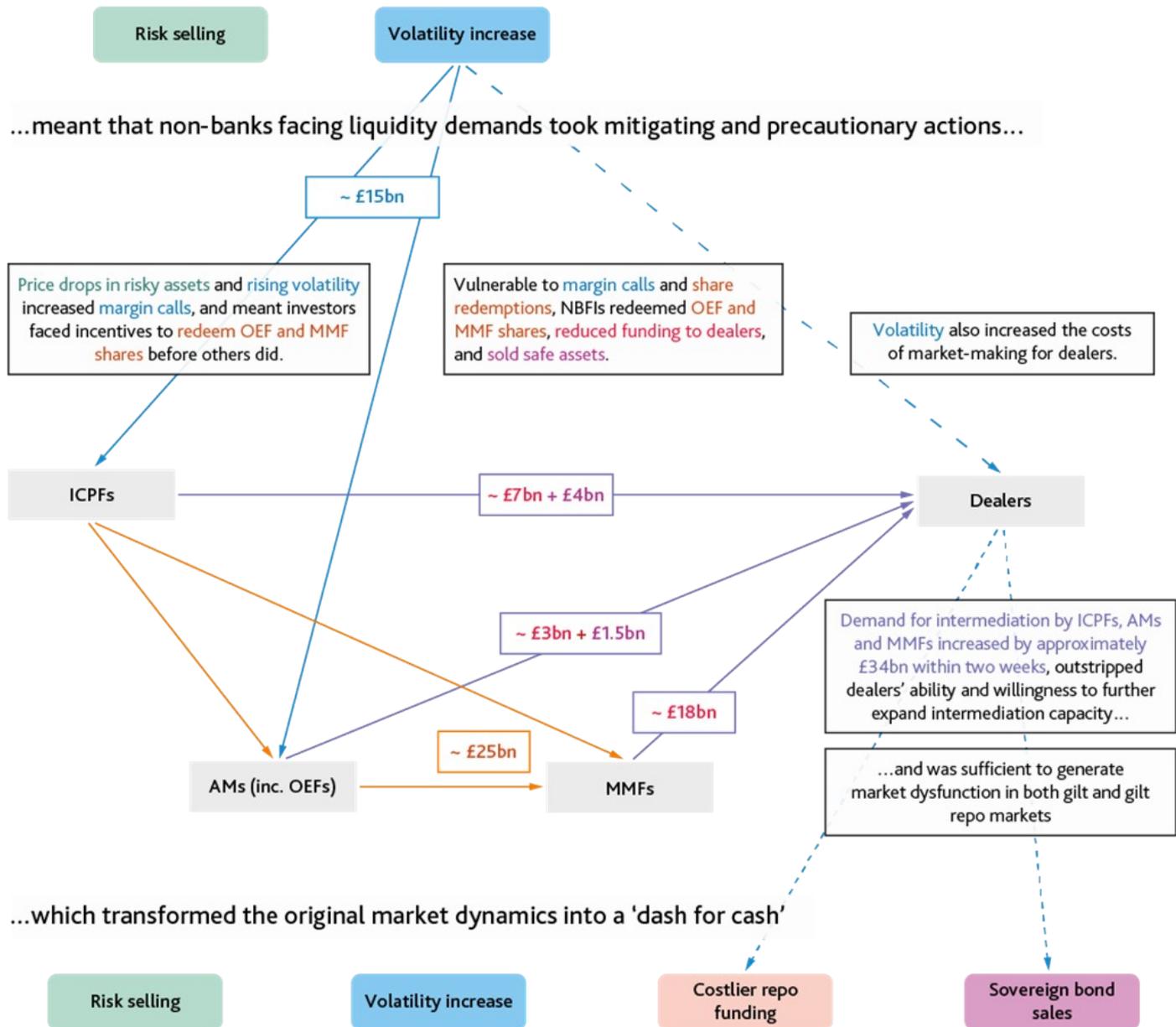
As shown in Section 4, ICPFs and asset managers (including OEFs) saw substantial increases in both initial and variation margin during the ‘flight to safety’ and ‘dash for cash’ periods. Overall, these amounted to approximately £15 billion during the ‘dash for cash’. In addition, redemptions from fixed-income OEFs increased markedly over late February and March (some of which would have come from ICPFs themselves). For example, these redemptions totalled £1.4 billion for funds investing in sterling corporate bonds during March. To meet these liquidity demands, ICPFs and asset managers sold risky assets, but also took additional actions which had knock-on effects on other NBFIs. In particular, ICPFs and asset managers redeemed shares from MMFs – which saw a total of £25 billion redemptions during the period between 12 and 20 March.

...and to establish their contribution to dysfunction in gilt and gilt repo markets.

As shown in Section 3, ICPFs, asset managers and MMFs, could also raise further liquidity by drawing on short-term funding markets (or reducing its provision of short-term lending), and by selling gilts. Indeed, ICPFs increased their net gilt repo borrowing by £7 billion over the ‘dash for cash’, and sold £4 billion of gilts in net terms between 9–19 March. Similarly, asset managers reduced their net lending by £3 billion, and sold £1.5 billion of gilts. Last, MMFs reduced their provision of funds from gilt repo markets (by £4 billion during the ‘dash for cash’), and sold longer-dated CP and CD (amounting to £14 billion over March).

This meant that the liquidity demands faced by NBFIs resulted in increased pressure on the market-based system, with dealers’ ability and willingness to further expand intermediation capacity being outstripped by the demand for gilt and gilt repo intermediation. This was sufficient to generate market dysfunction in both gilt and gilt repo markets.

Figure 5.1: Liquidity demands during the ‘dash for cash’ in sterling markets
 The ‘flight to safety’ observed in response to the Covid-19 economic shock...



Colour key and data coverage

- Sectors (ICPFs: Insurance companies, pension funds, and liability-driven investment asset managers. AMs: Asset managers. OEFs: Open-ended funds. MMFs: Money market funds.)
- Market dynamics
- ← Selling of risky assets
- ← ← ← Margin calls (9–23 March)/Increased market risk/limited market-making
- ← Redemptions from MMFs (12–20 March)
- ← Liquidation of gilts (9–19 March)
- ← Tightening in funding markets (9–23 March for repo, 2–31 March for commercial paper and certificates of deposit)

Sources: Bank of England Sterling Money Market data collection, Crane data, EMIR Trade Repository Data, FCA transaction (MiFID II) data, Morningstar, Supervisory returns and Bank calculations.

6: Conclusions and further work

In light of the developments in the real economy and in financial markets, NBFIs saw a rise in their liquidity needs...

During February 2020, the spread of Covid and the public health measures taken to contain it led to a sudden repricing of financial assets and increased volatility. As financial asset prices saw rising volatility, derivative exposures had to be adequately capitalised to manage counterparty credit risk. NBFIs with derivatives exposures were required to post margin collateral, and hence saw a rise in their liquidity needs.

...which led NBFIs to take mitigating and precautionary actions.

NBFIs are generally vulnerable to changes in the demand for and availability of liquidity, as previously highlighted by the FPC. In particular, NBFIs are vulnerable to increases in liquidity needs associated with margin calls, which may heighten their collective demand for liquidity. OEFs, including MMFs, are vulnerable to a rise in redemption demands, coupled with the sometimes fragile liquidity of the assets they hold.

As described in Sections 3 and 4, once NBFIs saw a rise in their liquidity needs, they acted swiftly to improve their deteriorating liquidity positions. For NBFIs facing increased margin calls, this meant selling securities and/or redeeming shares in OEFs to raise additional liquidity. Similarly, funds facing increased redemptions sold assets, or withdrew cash from short-term funding markets.

These actions had a knock-on impact on other NBFIs participants, which was exacerbated by underlying vulnerabilities, and amplified the liquidity shock...

Sections 3 to 5 of this paper show how each non-bank's action could result in another non-bank facing higher liquidity needs. In addition, these liquidity needs could be greater as a result of underlying vulnerabilities. For instance, meeting margin calls by withdrawing OEF shares could result in these funds needing to sell gilts as well as risky assets, or needing to withdraw shares from MMFs. Similarly, withdrawing MMF shares in order to meet liquidity demands could result in MMFs needing to withdraw cash from short-term funding markets. In both cases, the existence of liquidity mismatch risks could transfer and exacerbate the original liquidity needs, particularly where this put pressure on the markets intermediated by dealers. As liquidity needs accumulated, NBFIs became net sellers in gilt markets, which became illiquid and exhibited signs of dysfunction highlighted in Section 3. Similarly, NBFIs' increased demand for short-term funding and retrenchment from cash provision increased stress in short-term funding markets, with the gilt repo market seeing sharply higher bid-offer spreads, and likely exacerbated the deterioration of conditions in the gilt market.

...and resulted in systemic risks to financial stability.

Had the market dynamics outlined above continued unchecked, a range of corporates and financial institutions might have been unable to meet their obligations. In particular, wider bid-ask spreads, higher volatility and larger liquidity risk premia would have led to further difficulties in raising cash for financial institutions. Further stress at MMFs would have also raised the possibility of them suspending redemptions, which could have led to contagion across the MMF sector and directly impacted the ability of some large companies and other investors to access cash. Meanwhile, redemptions from OEFs would likely have increased further, triggering additional selling pressure and making it more difficult for governments and businesses to access finance.

As such, NBFIs' vulnerabilities, and their actions during the Covid stress period, resulted in systemic risks to financial stability.

This suggests a need to review the resilience of markets and the NBFIs sector.

As outlined above, the combination of precautionary actions taken by NBFIs helped to generate an amplification of the initial shock and dysfunction in the UK's core funding markets.

Therefore, it is crucial to examine the demands of NBFIs for liquidity in stress.

To further examine and, where appropriate, address specific risk factors which contributed to amplifying the shock, the FSB has started an analytical and policy work programme, in which the Bank is actively participating.

The findings in this paper could be complemented by expanding the coverage of analysis...

While this paper does present some preliminary findings on the role of NBFIs during the 'dash for cash', it cannot present a complete picture of it, nor of the 'dash for cash' as a whole. As outlined, this is largely due to the degree of interconnectedness between NBFIs, dealers, and other banks, and the global nature of market-based finance.

First and foremost, our analysis does not assess the extent to which factors that limit dealer capacity to intermediate may have contributed to the 'dash for cash'. Our work outlines how NBFIs became net sellers in gilt markets during a period of rising liquidity pressures, and how they demanded increased gilt repo funds while reducing their gilt repo supply. But factors limiting dealer capacity to intermediate may have also played a role, by enhancing the imbalance between supply and demand for intermediation, and its effects on market liquidity and on participants' ability to liquidate assets and raise funds. Further work on the factors limiting dealer capacity during the 'dash for cash' would help assess this vulnerability.

Second, the analysis in this paper is focused on sterling-denominated assets and therefore does not account for the effects of liquidity needs in other currencies, which are known to have played an important role during the 'dash for cash' (most notably in the case of the US dollar). As an example, NBFIs borrowing in short-term dollar markets may have led to an increase in liquidity needs as these positions became more expensive to roll over. Since these liquidity needs may have had an effect on sterling markets (for instance, if NBFIs held and liquidated sterling assets), it would be helpful to assess the importance of cross-currency liquidity needs during the 'dash for cash'.

...and by bridging gaps in the collection of relevant data.

Our analysis could also be improved by expanding the data sources used to analyse NBFIs liquidity demands arising from margin calls. For IM specifically, we use the margin paid by NBFIs clients of clearing members at UK CCPs as a proxy for the IM paid by NBFIs. Therefore, the data do not cover margin paid on non-centrally cleared derivatives contracts or at non-UK CCPs.

Similarly, our analysis could also be improved through more granular data on NBFIs asset holdings and transactions. Our analysis provides an estimate for the extent to which MMFs met liquidity needs through liquidating CP or CD, but a lack of daily data means we cannot establish how the funds' behaviour varied on a day-by-day basis, and their impact on short-term funding markets. For OEFs, our analysis estimates the extent to which redemptions in funds resulted in the sale of sterling assets, but more granular and higher-frequency data on fund flows and asset holdings would be useful to derive more robust estimates. In particular, our current estimates provide an incomplete picture of flows in and out of UK-regulated funds during the 'flight to safety' or the 'dash for cash', underlining the need to obtain more comprehensive fund flow data on the daily level.

Looking ahead, the FPC will work to fill data gaps to build a better understanding of the market-based system. More generally, addressing these data gaps would support the mapping of risk transmission through the financial system, and enhance the understanding of the resilience properties of the system as a whole.

Annex: Data sources used in the paper

Gilt and corporate bond data

We use the transaction-level MiFID II database, maintained as the 'Market Data Processor' (MDP) database by the Financial Conduct Authority, to analyse NBFIs volumes in the UK gilt and corporate bond markets. The data have been cleaned for research purposes by Bank of England staff. The MiFID II data cover all EU trading activity in both markets for bonds issued in the UK. Each transaction report from a legal entity contains information on the transaction date and time, International Identification Securities Number (ISIN), execution (clean) price, transaction quantity, as well as the reported legal identities of the buyer and seller.

The MiFID II data contains multiple reports by different legal entities pertaining to a transaction, and these have been processed for research purposes by Bank of England staff. The gilt market is intermediated by dealers (eg Gilt-Edged Market Makers) and interdealer brokers. As a result, many transactions and multiple transaction reports for each (NBFI) transaction frequently occur. We estimate the quantities bought and sold by firms from a given set of reports relating to a transaction. To do this, we implement an algorithm to disambiguate between multiple reports and identify the identity and quantities transacted, of the ultimate buyer(s) and seller(s) from multiple counterparties that may be involved. To facilitate this, we also implement an algorithm to detect any reporting errors made by firms. A manual validation of a random sample of the results of this algorithm resulted in a 95% accuracy rate by estimated traded volume. We allocate investors to an investor group (eg hedge funds) using a best-endeavour sectoral classification, which is naturally subject to uncertainties (eg allocation of insurer with asset management arm).

Gilt repo data

The Bank of England's Sterling Money Market data collection, Form SMMD, is a transaction-level data set covering the sterling unsecured and secured (gilt repo) money markets. The data have been collected since 2016, and is obtained from dealers in the respective money markets. This paper uses data relating to the gilt repo market to analyse the actions of NBFIs over the 'dash for cash' episode in March 2020. The data cover 95% of activity where a bank or dealer is a counterparty, but do not capture any non-bank to non-bank repo trades. Where data on repo amounts outstanding (stocks) are used, the figures provided account for maturing repo in each period. As for the cash gilt/corporate bond data, we allocate investors to an investor group using a best-endeavour sectoral classification.

MMF holdings

We obtain monthly data on MMF holdings from the proprietary Crane database. The MMF holdings data cover around 70% of the total assets under management of sterling MMFs. As we only observe the monthly holdings snapshots, we might miss net sales in the 'dash for cash' period that were potentially offset by net purchases in late March. Our estimates are therefore likely a lower bound for the MMF selling pressure in the CP/CD market.

Fund flows

We collect data on monthly fund flows from Morningstar. We consider flows of funds with at least 30% of their portfolios invested in the designated asset classes (eg advanced-economy corporate bonds).

Variation margin calls

VM calls are estimated using the EMIR Trade Repository Data on interest rate swaps, forward rate agreements, inflation swaps, and cross-currency basis swaps. The estimates are based on the methodology used in Bardoscia et al (2020), 'Simulating liquidity stress in the derivatives market'. We observe derivatives trades meeting one of the following conditions: i) one of the counterparties is a UK-regulated entity, ii) any leg of the trade is denominated or paid for in Sterling, iii) the trade is cleared by a UK supervised CCP, or iv) the underlying security is a UK entity. The set of entities covered in the VM calculations may slightly differ from the sample used in the gilt/gilt repo analysis. As for the previous datasets, we allocate investors to an investor group using a best-endeavour sectoral classification.



Initial margin calls

We use supervisory data on IM demands on NBFIs clients of clearing members at UK CCPs as a proxy for the IM paid by NBFIs. The estimates likely provide a lower bound for IM demands, as the data do not include IM requirements for uncleared derivatives as well as cleared trades at non-UK CCPs. Similar to the VM calculations, the set of entities covered in the IM data may slightly differ from the sample used in the gilt/gilt repo analysis. We again allocate investors to an investor group using a best-endeavour sectoral classification.

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 2. The views expressed in this paper are those of the authors, and are not necessarily those of the Bank of England.
 3. Throughout our analysis, we define the 'dash for cash' as the period from 9–23 March. The only exception is our analysis of the cash gilt market, in which we define the 'dash for cash' as the period from 9–19 March, given that conditions in the cash gilt market started to improve significantly following the MPC announcement on 19 March.
 4. Figure 1 is a stylised representation of the 'dash for cash' liquidity flows in sterling markets, and subject to limitations due to data availability. First, the time periods used for the types of flows differ due to limited data granularity. Second, the analysis does not incorporate liquidity flows in non-sterling currencies. Last, the estimates shown in the figure have been derived on a best-endeavour basis, as outlined in the Annex.
 5. Chart 3.13 in the following section also shows the limited extent of (aggregate) net borrowing by hedge funds in the gilt repo market before the 'flight to safety', underlining the limited prevalence of this leveraged arbitrage strategy in the UK gilt market.
 6. New issuance of gilts by the Debt Management Office that occurred during the 'flight to safety' and 'dash for cash' periods may also have contributed to dealer balance sheets becoming overwhelmed, to the extent that dealers continued to warehouse any new issuance on their balance sheet.
 7. Throughout the paper, we refer to 'gilt repo borrowing' to describe the borrowing of cash through the provision of gilts as collateral, and to 'gilt repo lending' to describe the lending of cash against gilts.
 8. For the rest of the paper, the 'flight to safety' period is defined as 24 February to 6 March and the 'dash for cash' period is defined as 9–23 March.
 9. The historical distribution of moves was calculated over the period 1 July 2017 to 23 February 2020.
 10. Since 1 July 2017 when repo stock data became available from the Bank of England Sterling Money Market data collection.
 11. See Box A for more detail on the 'business as usual' repo activity of non-bank participants.
 12. It is possible that CCPs may have offset part of the rise in repo rates caused by NBFIs. This is because CCPs receive part of their IM collateral in the form of cash, and reinvest such cash in the repo markets. Rinaldo et al (2021) show that CCPs' reverse repo activity decreases short-term rates, and Benos et al (2021) show that this mechanism becomes even stronger during times of high market volatility because CCPs receive more collateral than usual and end up supplying more liquidity via reverse repos.
 13. See '[Bank of England Market Operations Guide: Our tools](#)' for more details of the Bank of England's Sterling Monetary Framework operations in short-term money markets.
 14. VM calls are estimated using the EMIR Trade Repository Data on interest rate swaps, forward rate agreements, inflation swaps, and cross-currency basis swaps. See Annex for more details.
 15. Chart 4.2 shows IM requirements for NBFIs accounts at UK CCPs – see data caveats in the Annex.
 16. Based on monthly MMF holdings data covering around 70% of the total assets under management of sterling MMFs – see data caveats in the Annex.
 17. Similarly, gilt funds received £0.5 billion in net inflows during March (based on monthly data from 56 funds), but daily flow data available for a subset of funds suggest that investors redeemed substantial amounts during the 'dash for cash', consistent with the dynamics in the MMF space.



18. Figure 5.1 is a stylised representation of the ‘dash for cash’ liquidity flows in sterling markets, and subject to limitations due to data availability. First, the time periods used for the types of flows differ due to limited data granularity. Second, the analysis does not incorporate liquidity flows in non-sterling currencies. Last, the estimates shown in the figure have been derived on a best-endeavour basis, as outlined in the Annex.



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