



BANK OF ENGLAND

Speech

The Dash for Cash and the Liquidity Multiplier: Lessons from March 2020

Speech given by

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I thank members of the FPC for ongoing conversations on these issues, as well as Lee Foulger, Andrew Hauser, and especially Imane Bakkar, Bernat Gual-Ricart, Nick Jackson, Grainne McGread, and Matt Roberts-Sklar for comments on this speech. The views here are my own and not necessarily those of other members of any of Bank of England's policy committees.

Introduction

Thanks for having me. I was hoping to be here in person and look forward to seeing everyone face to face as soon as that is safe to do.

I am especially pleased to be speaking at the event organised by London Business School's AQR Asset Management Institute. AQR Capital Management was founded by several alumni of my home academic institution and I actually interviewed

Cliff Asness (the A in AQR) at a conference last week. Cliff and his colleagues are super thoughtful and I am sure that the interaction with the LBS faculty is rewarding for you and them.

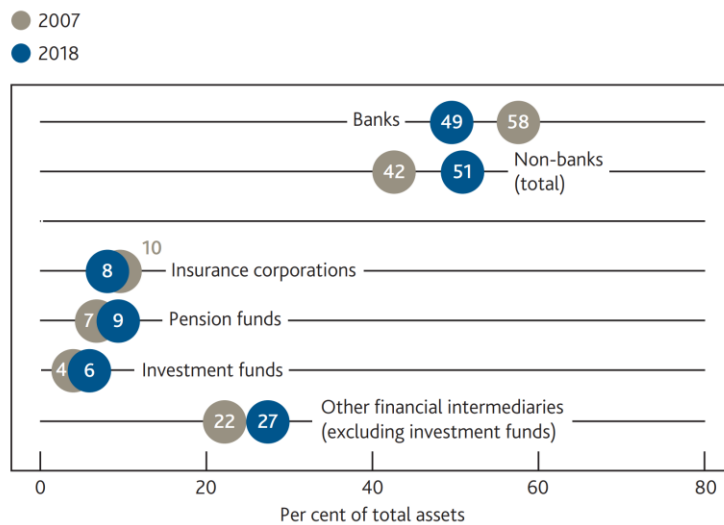
Today, I am here in my capacity as an external member of the UK Financial Policy Committee.

Our Committee was created after the last financial crisis to try to make sure that the UK financial system is resilient to, and prepared for, the wide range of risks it could face. Our Committee mantra is that we want the financial system to be able to serve UK households and businesses in bad times as well as good.¹ I would like to share my thinking about some of the lessons about financial stability risks that became evident after the market disruptions in March of this year.

The financial system plays three critical roles for society: it funnels savings to people who want to borrow, it helps people and businesses share risks, and it supports economic exchange by facilitating payments. I want to start by noting that more and more of these functions are being conducted outside of what you'd traditionally think of as the banking system (**Figure 1**). The landscape of the market-based finance (MBF) system is quite diverse and includes securities and derivatives dealers, asset managers, pension funds, insurers, and a wide range of investment funds and money market funds (MMF). More important than the exact numbers in the chart is the direction of travel, I expect the growth of MBF to continue for the foreseeable future.

¹ For more background on how the FPC operates see '[Come with me to the FPC](#)', Speech by Anil Kashyap given at the Official Monetary and Financial Institutions Forum, 13 June 2018 and '[My Reflections on the FPC's Strategy](#)' Speech by Anil Kashyap at the "50th Anniversary of the Journal of Money, Credit and Banking, Frankfurt, 28th March 2019.

Figure 1: The share of non-bank UK financial sector assets has grown over the past decade



Sources: The Association for Financial Markets in Europe, Bank of England, Bloomberg Finance L.P, FCA, Morningstar, ONS, published accounts and Bank calculations.

In March, the news about the pandemic led investors to revise their views about risks and many asset prices needed to adjust. There are now lots of narratives about what happened – I particularly recommend two accounts by Jon Cunliffe and Andrew Hauser given in June². I want to home in on one important part of the story, how the chains of entities that exist in the MBF system can contribute to problems during periods of stress.

This leads me to focus on funding flows between different parts of the system. I will introduce the concept of a liquidity multiplier that is created by the presence of the chains and give some first thoughts on how this multiplier can create fragility. This analysis draws heavily on ongoing work that you will be hearing more about from the Financial Policy Committee in the coming year. So my comments today should be viewed as an opening of a conversation rather than a final word.

I will split the rest of my remarks up into four parts. First, I will describe a funding chain that is typical of those in the MBF system. We will see that these chains can create five types of funding linkages. Next, I will briefly review the events of March that are relevant for these linkages. Third, I will give some illustrative calculations about how the liquidity multiplier can operate. Finally, I will pose some of the policy questions that arise because of these chains and the liquidity multiplier.

² [Seven Moments in Spring](#) (Andrew Hauser, 4 June 2020); [Financial System Resilience](#) (Jon Cunliffe, 9 June 2020).

Funding chains in market-based finance

As I already noted the financial system serves many purposes. Let's start by reviewing an illustrative chain that is motivated by US patterns. I pick this one, precisely because I do not want to open a debate about the structure of the UK market based financial system. Put differently, my goal today is to make some analytic points rather than to present a map of the UK financial system with realistic estimates of funding flows.

So consider a defined benefit pension fund manager (PF) who needs to keep some liquid assets to pay out upcoming pension payments and meet margin calls on derivatives. Suppose the PF wants to diversify her counterparty risk, improve her cash management, and perhaps improve her returns. She can take some of her bank deposits that she holds to meet immediate outflows, and place some of them into a money market fund (MMF). This holding is redeemable and may offer a better yield than a bank account.³ The MMF can do many things with the cash. The options include: on-depositing it at a bank; purchasing short-term paper, typically of other financial institutions; purchasing government debt; or lending the cash out via reverse repo, receiving a bond as collateral. Suppose the last choice is made, with a broker-dealer (BD) borrowing the cash. The contract might be for one night so as to ensure the MMF can get the money back if it faces redemptions. The broker-dealer can then lend the cash on to a client, say a hedge fund (HF), often in a term-reverse repo transaction (so the broker dealer faces a maturity mismatch by delivering its client some funding stability). The HF can then use the loan to invest (for instance, in government bonds).

One common hedge fund investment strategy is the so called cash-futures basis trade that Jon Cunliffe talked about last week.⁴ Jon described this in detail, so I will be brief here. This trade is usually described as a convergence trade where the hedge fund attempts to correct perceived mispricing between futures and cash prices of sovereign bonds. It is worth thinking a bit about why this opportunity exists. My view is that it is a consequence of other actors in the MBF system trying to enhance their returns.

For example, an asset manager of a long-term government bond fund who seeks to boost returns may choose to buy futures contracts to meet its investment mandate, and then take funds that would otherwise have been used on government bonds to buy higher yielding securities. This decision has several knock-on effects. First, the asset manager has to make some margin payments against the futures contract. Second, if this strategy is done in scale, the futures price will be slightly distorted relative to the underlying bonds, and will trade at a higher price than otherwise. Third, someone has to be selling the futures contract to the asset manager (via the exchange). If the price is distorted, it's likely to be hedge funds stepping in to correct the mispricing. Whoever is performing the arbitrage will also post margin.⁵ The hedge fund then buys bonds and pockets the differences in the prices. These deviations are small, and as Jon explained in his speech,

³ For simplicity, here, I am ignoring the fact that many assets owned by the MMF invests are not liquid, so that the actual ability to meet redemptions can be another source of problems (see the [August 2020 Financial Stability Report](#)).

⁴ [The impact of leveraged investors on market liquidity and financial stability](#) (Jon Cunliffe, 12 November 2020)

⁵ Margin payments are also needed to support other common trading arrangements in the MBF system. For example a typical liability driven investment strategy involves hedging, in whole or in part, the fund's exposure to changes in interest rates and inflation using swaps and other derivatives. In March, large margin calls on derivatives positions such as these, as well as currency swaps, forced pension funds, insurers and investment funds to raise cash through repo or asset sales of bonds.

that means the hedge funds would use considerable leverage to boost the returns. We will see shortly why this leverage can matter.

Notice that the individual firms in these examples have good reasons to conduct these transactions. They all are motivated by improving returns and recycling collateral in efficient ways. In particular, when a pension fund manager boosts returns by borrowing to fund a position, the better returns for the pension fund will mean less pressure on corporate sponsors to fill deficits. Collateralised borrowing and lending is a relatively safe and cheap way to organise loans. The arbitrage trade reduces discrepancies in price between securities and in this case lowers borrowing costs for the government and ultimately the taxpayer.

Nonetheless, these chains create interconnections and can create contagion in liquidity demands. Generically, there are five ways that they can create funding needs for the various parties in the transactions. First, any derivatives trading involves margin payments that protect both parties in the contract from future price movements. There are two different types of margin payments, the initial amount posted that accounts for typical price fluctuations that might occur (initial margin), which may need to be topped up when volatility increases, and the so-called variation margin that reflects changes in the mark-to-market value of the derivatives positions, shifting money from losers to winners.

Next, there is the possibility of a redemption. Any investor in the money market fund may need their funds back and so could make a withdrawal. In this case, the money market fund must find a way to meet the redemption.

Finally, access to repo funding can change in two potentially offsetting ways. Many repurchase agreements are relatively short maturity and lenders may choose not to roll over the funding, or to charge a much higher price. On the other hand, broker dealers are providing an essential service to their clients by offering funding in the repo market, if a client requests additional funding, a broker that refuses to provide it risks losing the client.⁶ So a BD could have to extend additional funding, even if it would prefer not to. So observed repo volumes will reflect the balance of loans that were not rolled over and loans that were reluctantly granted.⁷

We will see in a moment how all this fits together, however, before turning to any hypothetical examples, let me relate all this to what we saw happening at the outset of the pandemic.

⁶ One of the lessons from the financial crisis is that having only a single broker dealer was risky and most firms that rely on brokers now split their business across several brokers.

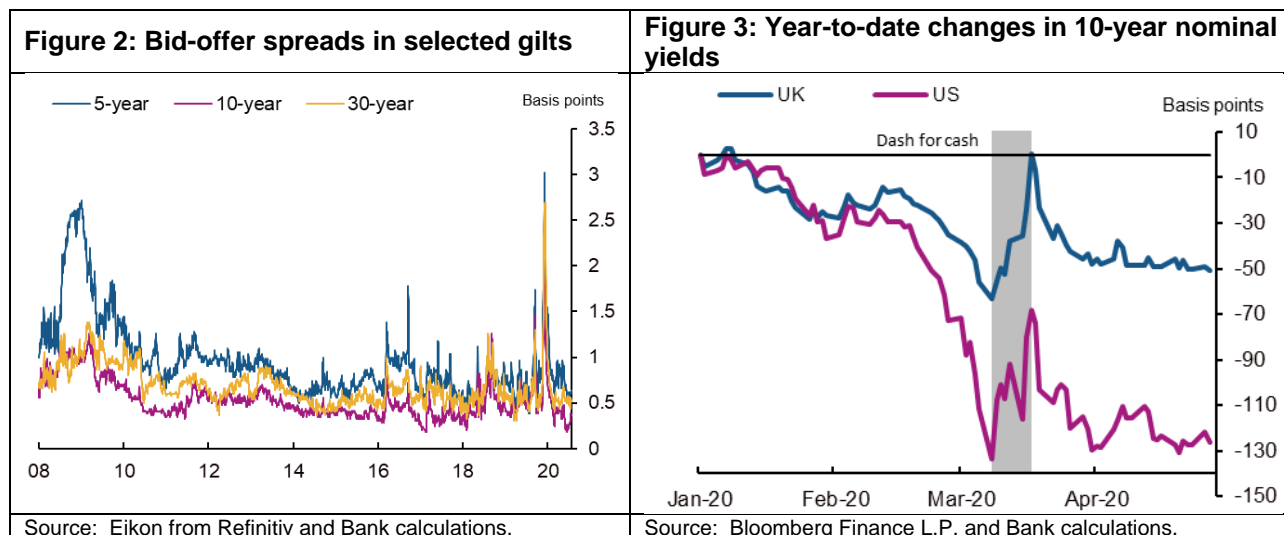
⁷ A similar issue can arise in other versions of the chain. For instance, if MMF refuses to continue to buy commercial paper, the paper issuer may draw on a backup line of credit to roll over its funding.

The March ‘dash for cash’

March saw the deterioration of economic prospects and heightened uncertainty due to Covid. Loosely speaking, investors moved out of risky assets into safe assets as a result. There was also a heightened concern that the situation could deteriorate further so it is likely that some actors became more cautious about lending and retained funds on a precautionary basis. The asset price moves and increased volatility also led to large variation margin payments and higher initial margin requirements.

As I already said, there are now many detailed accounts of the sequence of events in March both in Bank of England speeches and in staff analyses.⁸ So I am not going to recount this part of the episode. Instead, I want to highlight what we know about changes in liquidity positions through the five channels I just mentioned. One of my punchlines is that our measurement of liquidity positions and funding flows is poor and is where much more work, including international cooperation is needed. So what I will describe is partly a reflection of what we can measure, which is not necessarily what we would like to measure.

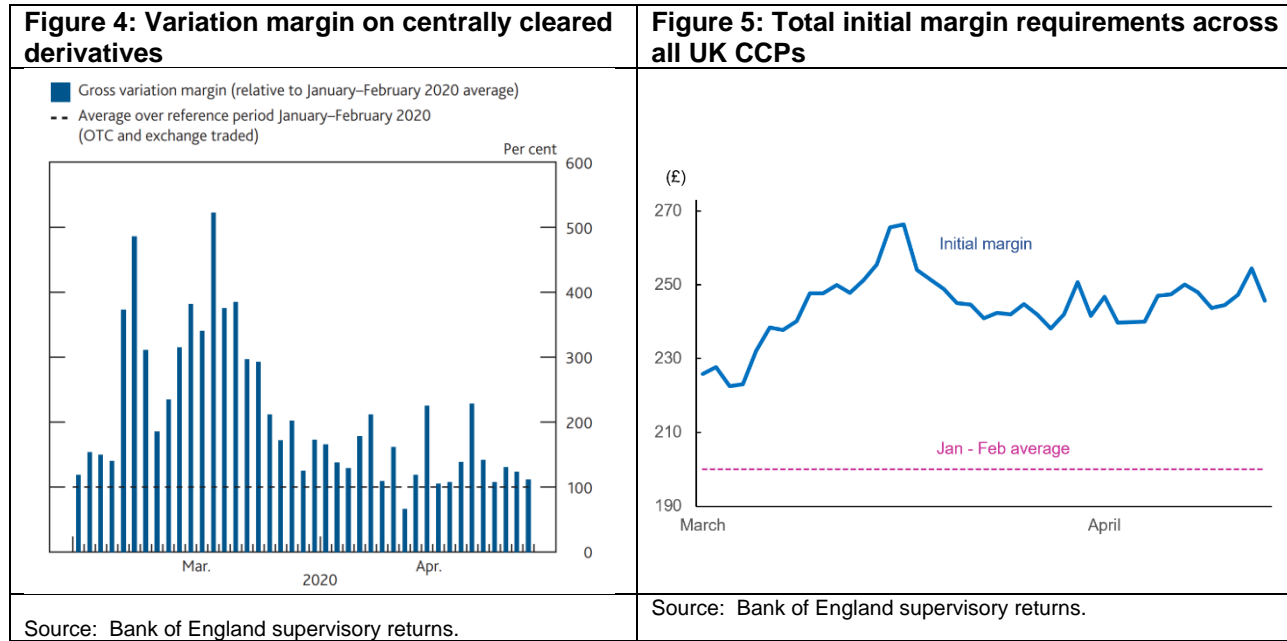
First, asset prices in March became much more volatile. **Figure 2** shows market liquidity deteriorating in March as a result, which then fed back through to price volatility (**Figure 3**). This mechanically means that both types of margins will rise. Market data such as prices, volumes, and even liquidity metrics are reasonably easy to measure, margin increases are generally more opaque. There is good data on margins for cleared derivatives via supervisors of central counterparties.⁹ However, data on margins for non-cleared derivatives are patchy at best, obtained either from firms via supervisory intelligence or estimated from derivatives positions data.



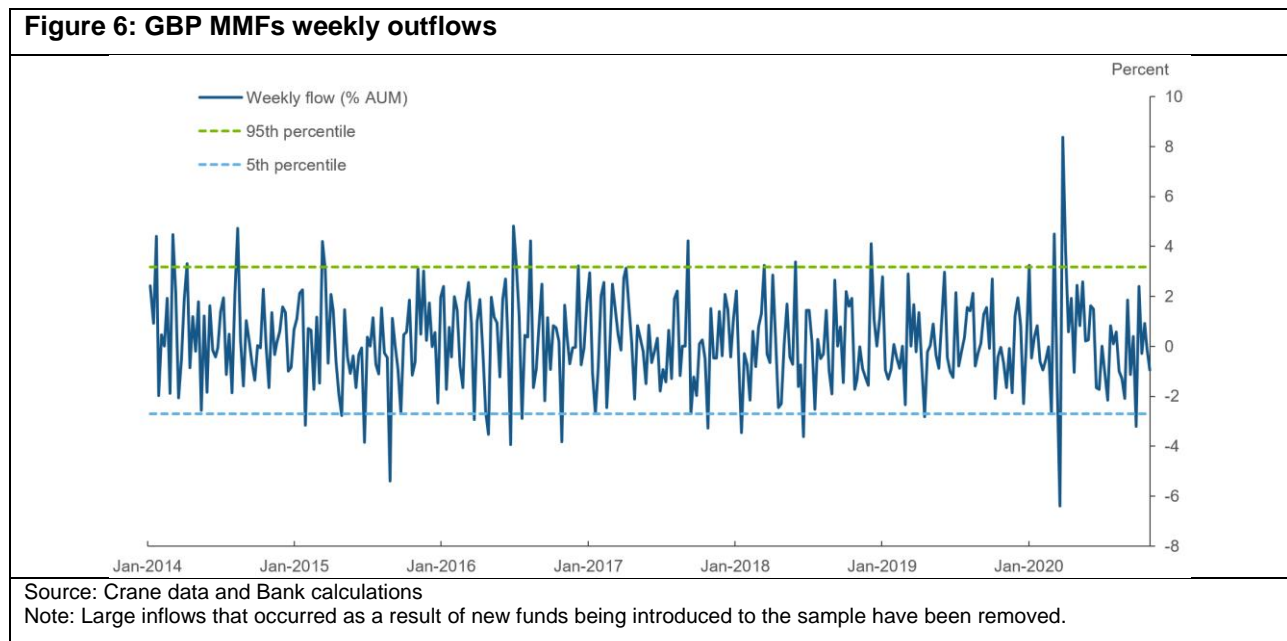
⁸ In addition to the speeches outlined in footnote 1 please see the Bank of England [May 2020 Interim Financial Stability Report](#).

⁹ However, these cleared margin data only allow us to see whether margin was paid/received by clearing members or their clients, not which type of entity the clients were.

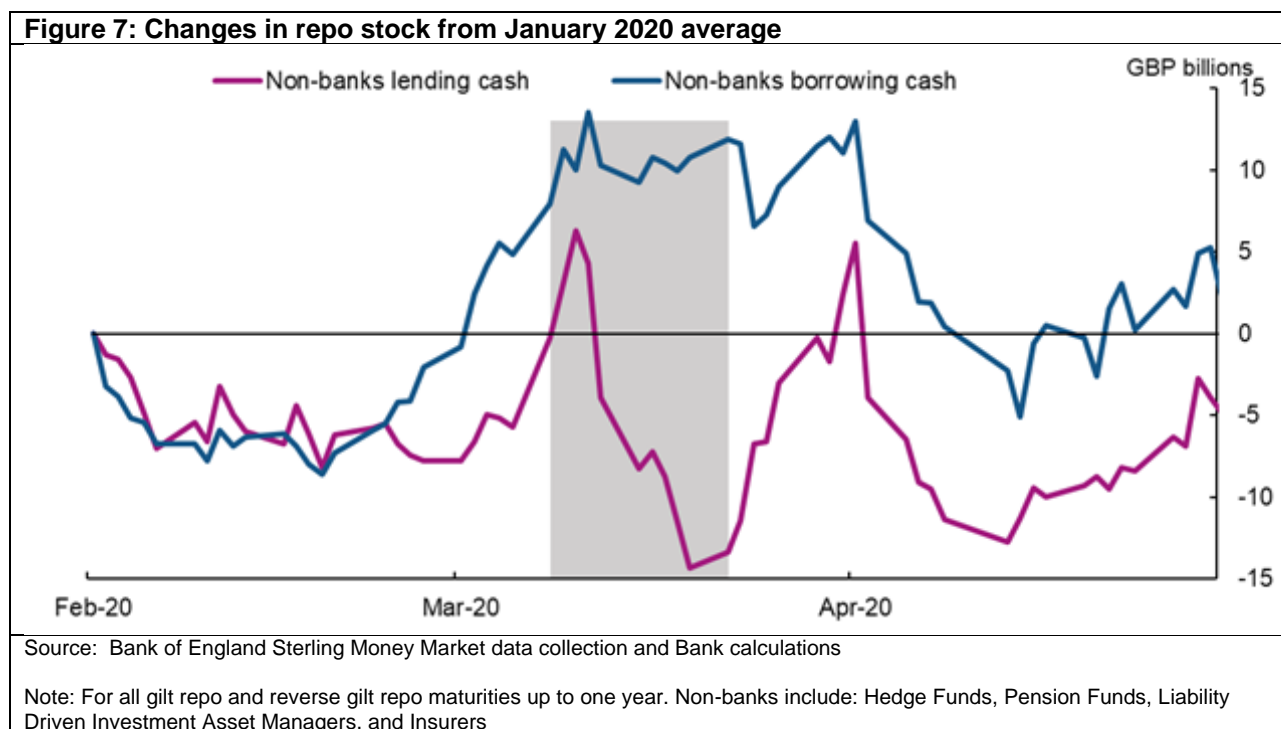
Figures 4 and 5 show the levels of initial margin and variation margin that were posted during the stress for UK centralized counterparties (CCPs). There were significant increases in initial and variation margin calls, on both cleared and uncleared derivatives. At the peak in March, daily gross variation margin calls — which mirror moves in underlying markets — by CCPs were five times higher than the average in January–February, at around £30 billion, and for initial margin the January to March trough to peak increase is around £75bn.



Next consider redemptions from MMFs. Here again, historical data is not readily available so we have few periods of stress for comparison. **Figure 6** shows the outflows over the last few years, and you can see that March was an outlier.



Finally, we have very detailed transaction data on the gilt repo market.¹⁰ We can see transaction volumes (**Figure 7**), and prices and who traded with who. But we have no direct way to observe whether there was rationing or whether dealers were being asked by clients to extend funding that they would have rather not granted. For that, we can supplement our data analysis with market and supervisory intelligence. In March, lending to clients in repo went up quite a bit, while lending by clients actually contracted. The disruption in prices confirms that repo borrowing outstripped repo lending



As we all observed, central banks responded to the market turmoil with massive force. For instance, the Bank of England's purchases of gilts were increased by £200bn in March 2020 and will total £875bn. The Federal Reserve's response also was enormous, and came via the introduction of multiple programs. Ultimately, markets did calm down. However, the large central bank responses seem to far exceed the need for funding. Understanding the full palliative effects of the interventions is an area of active research. In the meantime, can we understand why the amount deployed might have needed to be so large?

A liquidity multiplier model can help us understand risks to financial stability.

To assess magnitudes, I believe we need to understand how the actors in the chains I described earlier interact. The key insight is that interactions create a cumulative need for liquidity that can far exceed the liquidity needs of any one party in the chain. As an analogy, recall the money multiplier that many of you were taught in your basic macro class at University.

¹⁰ See "[Sterling money markets: beneath the surface](#)"

In the case of the money multiplier, the question asked is what happens when the central bank makes an open market purchase (of say £1000) and pays for the securities it acquires with reserves. Textbooks suppose that the initial £1000 becomes available to the banking system to lend. So some fraction of the reserves will be lent to a borrower. That borrower will choose how much of the loan to hold in currency and how much to redeposit. We then explain that the money will be redeposited and this allows the bank to lend another fraction of that redeposit to a new borrower. The new borrower will retain some of the loan and redeposit the remainder. The public in this examples views both currency and deposits as “money”.

The ultimate size of the increase in money in the example will far exceed the £1000 because of the relending and redepositing. The gap in the simple example depends on just two behavioural choices: the fraction of deposits that banks opt to re-lend and the fraction of each loan that borrowers opt to re-deposit. If each borrower redeposited half of the money it received and the banks always retained half of what they got and lent the other half, the total size of the increase in the money supply would be £1500.¹¹

As we will now see, the chain I have described is one example of how funds are recycled in the market based financial system. In this case, at each link in the chain, one party’s perceived liquid asset is another party’s (runnable) liability. The exception to this rule is when a party accesses the banking system either to make a payment or draw down a deposit account rather than getting funding from another counterparty in the chain. In that case, bank liquidity rules and access to central bank facilities ameliorate the run risk for the bank.

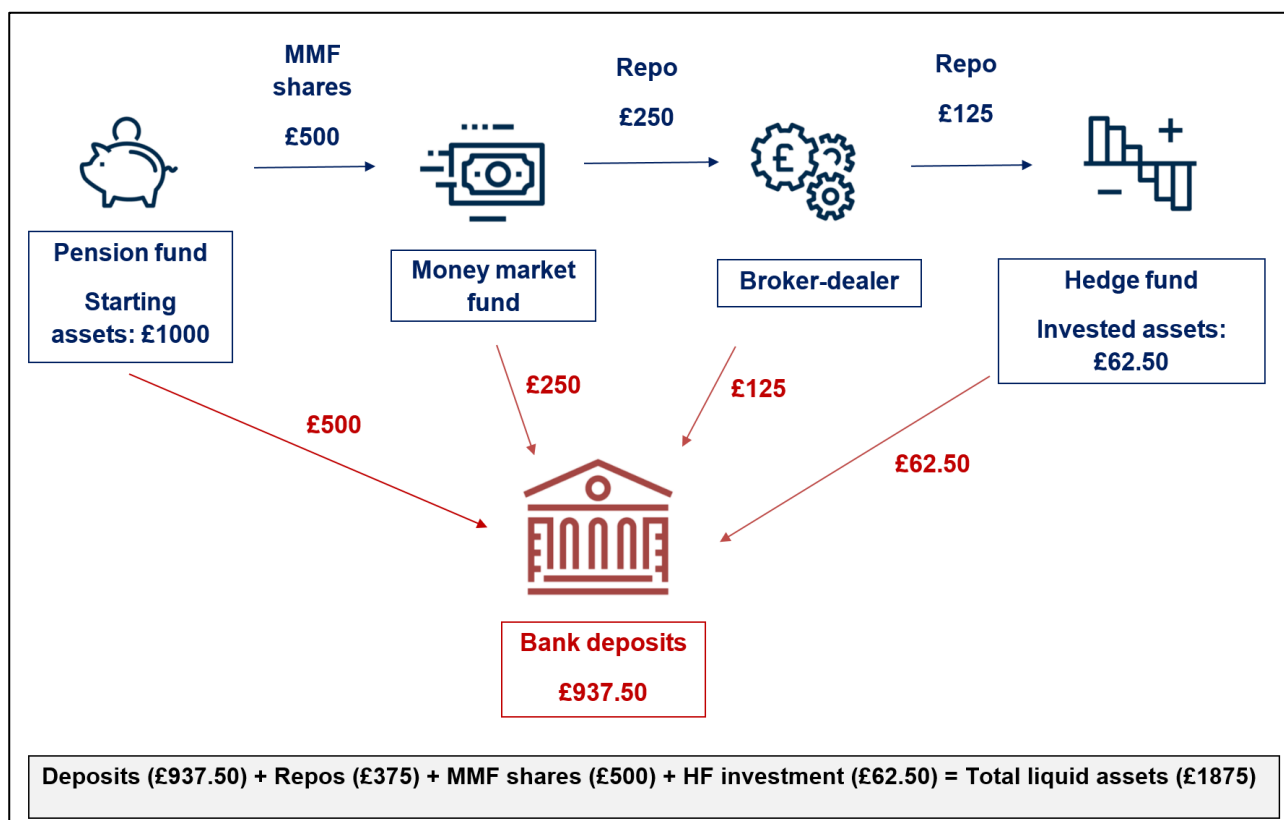
To see this more concretely let’s return to our hypothetical chain. I will again make assumptions so that the math is easy to follow (rather than being realistic).

Suppose our PF manager initially had £1000 in idle cash that was available for paying out to pensions or margin calls and chose to place £500 with the MMF. The MMF is required to retain some of that cash as a precaution in case the PF makes a redemption request. Suppose again that the MMF lends half, £250, in a repo transaction to the BD (and deposits the rest at a bank). The BD then can use cash it receives to assist clients. Assume again it takes half of its cash and makes a loan via term purchase agreement to the hedge fund, and deposits the other half in a bank. This means that the HF receives £125 through the long-term repo agreement. If it deposits half of that, it can invest the other half to acquire £62.50 in government bonds. (See **Figure 8** for the full chain.)¹²

¹¹ Of course, reality is more complicated and when reserves are abundant this reasoning is incomplete. <https://www.bankofengland.co.uk/quarterly-bulletin/2014/q1/money-creation-in-the-modern-economy>

¹² I have truncated the chain so that we do not keep track of the remaining money that flowed to the entity that sold the securities to the hedge fund. Followed to the full conclusion of the chain, all the initial deposits will wind up back in the banking system.

Figure 8: Stylised example of pension fund cash chain



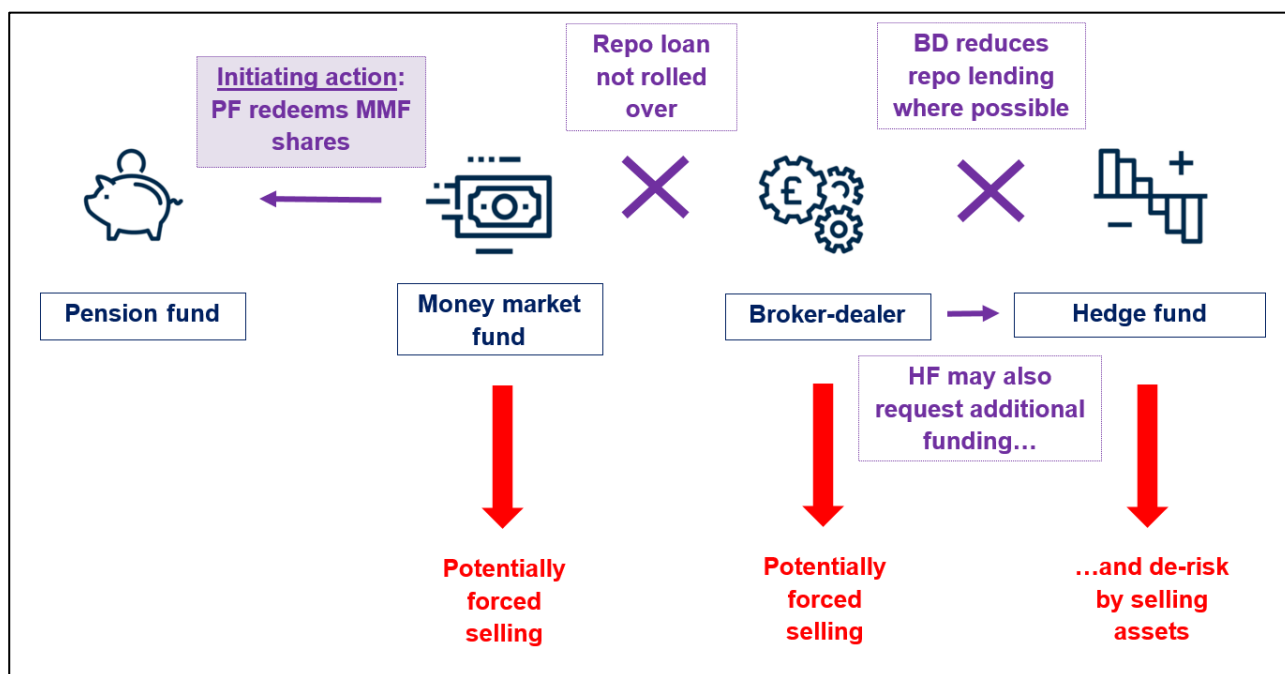
This recycling is the market version of the money multiplier. Here we started with £1000 which could have simply been deposited in the bank. By the end of the chain, we have deposits of £937.50 (=500+250+125+62.5) and £62.50 of government bonds, as well as £500 of MMF shares and £375 in government bond repo. As far as the entities in this chain are concerned the total amount of liquid assets is the sum of the deposits, repos, MMF shares and the invested assets of the hedge fund: £1875.

Essentially the size of the multiplier reflects a race between two forces: the number of links in the chain in which funds are passed along and the dampening from interactions with the banking system when funds are placed there. I don't want to imply banks themselves cannot get into trouble with the deposits they receive. Likewise, they are connected to the MBF system in other ways too that create important interactions and with these interactions, potential risks. In the context of the liquidity multiplier, though, they do tend to limit amplification, partly because of their direct access to central bank liquidity support.

Our interest in these chains is not just what happens in normal times, but also what might happen in a period of stress when funding flows begin to reverse direction. The shocks that create the stress might well lead some actors in the system to become more cautious, so that they pull back from normal practices to accumulate extra liquidity. This behaviour can mean that actors in the chain might go beyond just reversing their normal patterns and actually withdraw even more liquidity than is normally present in the system.

To see how this can work, suppose the pension fund withdraws its funds from the MMF, say due to margin calls (though the reason is irrelevant). The MMF can meet some of the redemption from the cash it holds, however, it may not want to run down that buffer too much and may choose to refuse to roll over its repo loan to the BD. If the MMF becomes concerned that other redemptions are coming, it may cut back on other repo loans it has made and/or it might try to sell some of its other securities as a precaution so that it can have more cash to meet redemptions. Absent constraints, the MMF would initially want to sell the assets that will have the least price impact from selling.¹³ If it happens to have a large enough buffer of such securities, the selling need not exacerbate any of the problems in the market. If it does not, then it could be forced to sell securities for which there is not an active, deep market. In this sense, the surge in trading volumes that we saw in the US in March, is not surprising (see **Figure 9**).

Figure 9: Defensive actions taken by parties in the chain



Next, the BD must find a way to fund its loan to the HF, recall that was a term repo so it will remain in place for some time. It could sell some assets to receive the funds it needs to replace the repo that disappears, or reduce the overnight repo it offers, especially to smaller clients. In addition, the BD may worry that the HF is going to request additional funding because market conditions are now choppy and the HF may be needing to pay margin calls on its trades, and expects to have other repo loans recalled.

As indicated earlier, the business of a broker dealer involves helping clients receive funding. This can mean that in times of stress the BD is forced to extend credit that it might prefer not to offer, but failing to do so will lead clients to move to a competitor. So at the same time the BD is seeing its own repo funding decline,

¹³ In practice, things are more complicated. The MMF has liquidity requirements that must be maintained. Also, if they fear some securities may become illiquid (or more illiquid), they might sell them while they can.

it might be forced to expand its repo lending. If it has to do this, it will likely be selling assets to obtain cash that it can lend.

In our chain, we had the HF buying government bonds so if it loses funding it would potentially sell those bonds. If instead it had a leveraged position to undertake a basis trade, then it would face margin calls from the price volatility. The high degree of leverage underlying the basis trade means that even small price movements can create big losses (or gains) for the hedge fund. If the trade is moving against the HF, its risk managers may conclude that it should exit the trade. This would contribute to further selling and price pressure. So in this case, the ultimate adjustment by the HF can be much larger than one might expect from the normal flows in the chain.

The critical observation is that because some parties are taking steps to build buffers against further stress, and because selling can move prices against the seller, the ultimate drain on the system can easily *exceed* the normal amount of liquidity that was being passed within the chain. Put differently, in stress, if the multiplier begins working in reverse the needed adjustment can be larger than what might be expected based on business as usual flows.

This discussion identifies another problem. We have essentially a 20th century measurement system that is being used to monitor the 21st century financial system.¹⁴ So when it comes to putting realistic numbers into this kind of calculation we find that some critical pieces of the chains are not well covered. We do have good coverage in several areas such as gilts, repo, and derivatives, but the challenge even with this data is to piece it all together. Furthermore, it is hard to tell the difference between forced actions where someone on the chain must immediately replace lost funding and where someone might just be anticipating future problems and taking precautionary actions that cause problems for others.

The staff at the Bank of England are working intensively on filling in as much of the landscape as we can over the next year. Importantly some of the critical linkages go across borders, so some of the measurement challenges require international cooperation. This is why the Bank of England is also helping lead the work by the Financial Stability Board to coordinate efforts across the globe.

Conclusions and next steps

Even with the caveats I just gave you, the examples I just shared allow us to reach a few conclusions and to identify some obviously important questions that deserve further analysis.

First, the MBF system is built on chains for many good reasons. Yet, these chains create liquidity multipliers. What one party sees as a liquid asset someone else in the chain sees as a runnable liability. Mechanically, this means that when certain actors pull back funding, and/or markets become illiquid, the shock ripples

¹⁴ This is despite the fact that the FSB has been calling attention to these issues for some time, see e.g. [2020 Progress Report on Data Gaps Initiative](#)

through the financial system. During periods of stress the amplification can be especially large as parties in the chain take various defensive actions.¹⁵

Second, one of the major factors that dampens amplification is the recourse of various parties to banks. A bank deposit is essentially always sufficient to make a payment. So every time an entity in a payment chain sets money aside in the form of a deposit that can help reduce this amplification.

Hopefully, we will not face a shock anywhere near as large as the Covid one in the near future. However, the recent experience can still teach us about the system we have in place and the risks that reside within it. Let me close with three questions that I am thinking about and perhaps some others will come up in the question and answer period.

One is whether the regulatory system addresses these challenges adequately? We do have some protections in place that require liquidity buffers for some sectors. Are these sufficient? We can also ask whether the post GFC regulatory reforms we have enacted might have inadvertently created incentives to organise funding through chains that are particularly vulnerable?

Another question is what will be expected of central banks in future stress episodes? In March, the stress was ended by a host of new programs and a large expansion of central bank balance sheets. Should central banks be expected to repeat these actions? If so, is there a way to charge the beneficiaries of the support for the liquidity insurance that central banks are providing ex-post?

Finally, can we make a map of the most important funding chains so that we can monitor them and potentially catch problems before they appear? Armed with a map we could then try to identify the links that are most fragile and begin trying to understand what can be done to strengthen them or move away from them.

Thanks for your attention, I would be glad to take a few questions.

¹⁵ For an individual actor, the precautions are likely to be prudent. The point, however, is the cumulative impact of the combined decisions throughout the chain can lead to a large system-wide effect on liquidity needs.