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# Exploring the relationship between the collateral in the interbank loan market and U.S. short-term interest rates

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## **Introduction**

The interbank loan market is a vital component of the global financial system, providing a mechanism for banks to lend and borrow funds from each other. In this market, the use of collateral is common to mitigate counterparty risk and ensure the safety and soundness of the financial system. However, the relationship between interbank collateral and short-term interest rates is complex and not yet fully understood.

This study aims to investigate the relationship between the collateral in the interbank loan market and short-term interest rates. The study will analyze the mechanisms of collateral and interest rates and examine the impact of collateral on the interest rates of overnight loans in the United States by studying two recent cases regarding the failures in the repo market.

By analyzing these two cases, this report will provide insight into the relationship between interbank collateral and interest rates, as well as the factors that influence this relationship. In addition, this study will also discuss the possible impact of replacing LIBOR by SOFR in the future. The findings of this study will provide valuable insights into the functioning of the interbank loan market and the factors that affect short-term interest rates.

## Reference rates

In order to fulfill the reserve requirements or manage its liquidity, many commercial banks borrow in the interbank lending market. On the other hand, commercial banks with more cash in hand than what they are required to have in reserve according to the regulation can decide to either put more savings at Central banks to earn interest at the base rate or lend it out to other banks in a short-term. When lending out their cash to other commercial banks, the commercial banks have the freedom to determine the interests they charge. Therefore, commercial banks need reference rates as benchmarks to calculate their own interest rate for financial contracts including mortgages, consumer loans, student loans, car loans, corporate loans and also diverse financial instruments such as swaps.

### *Interest rates & monetary policy*

Monetary policy refers to the actions taken by a central bank to influence the supply and demand of money and credit in an economy, with the goal of achieving macroeconomic objectives such as price stability and full employment. One of the key tools of monetary policy is the manipulation of interest rates, which can affect the cost and availability of credit, thereby influencing spending, investment, and inflation.

Interest rates are the cost of borrowing money, typically expressed as a percentage of the amount borrowed. In the context of monetary policy, interest rates can be used as a tool to influence economic activity by affecting the cost and availability of credit. Central banks can influence interest rates through a variety of mechanisms, including the following:

- Setting the policy rate: Central banks can directly control short-term interest rates by setting a policy rate, such as the federal funds rate in the United States or the overnight rate in Canada. By adjusting the policy rate, the central bank can influence the cost of borrowing funds in the interbank market, which can in turn affect other short-term interest rates.
- Open market operations: Central banks can also influence interest rates through open market operations, in which they buy or sell government securities in the open market. By buying securities, the central bank can inject liquidity into the financial system and put downward pressure on interest rates. Conversely, by selling securities, the central bank can withdraw liquidity from the financial system and put upward pressure on interest rates.

- Forward guidance: Central banks can also influence interest rates through forward guidance, in which they provide guidance to financial market participants about their future policy intentions. By signaling that they intend to keep interest rates low for an extended period, for example, central banks can influence longer-term interest rates and encourage borrowing and investment.

Academic research has examined the effectiveness of these and other monetary policy tools in influencing interest rates and affecting economic activity. For example, a study by Gagnon et al. (2011) examined the impact of the Federal Reserve's large-scale asset purchases (LSAPs) on long-term interest rates during the financial crisis. The study found that LSAPs had a significant impact on long-term interest rates and helped to stimulate economic activity.

Another study by Bernanke and Blinder (1992) examined the impact of forward guidance on interest rates. The study found that forward guidance can be an effective tool for influencing interest rates and that the effectiveness of forward guidance is enhanced when it is communicated clearly and credibly.

Overall, these and other studies suggest that interest rates can be an important tool for central banks in influencing economic activity and achieving their policy objectives. However, the precise impact of interest rates on the economy can depend on a variety of factors, including the structure of the financial system, the level of economic activity, and the nature of shocks affecting the economy.

### *EFFR*

Effective federal funds rate is the interest rate at which banks and credit unions lend reserve balances to other depository institutions overnight on an uncollateralized basis in the United States. This reference rate is the weighted average median of this rate across all overnight federal funds transactions during the previous business day. It is published daily by the Federal Reserve Bank of New York. The reason why it is called effective federal funds rate is because the Federal Open Market Committee (FOMC) periodically sets a target range for federal funds rate according to its policy goals and the economic conditions of the United States. In order to achieve this target range, the central bank usually influences the interest rate through adjustments to their own deposit interest rate or open market operations, which the central bank gives or takes liquidity in its currency through buying or selling government bonds (Board of

Governors of the Federal Reserve System, n.d.). Conversely, dropping the interest rates will encourage banks to borrow money and therefore invest more freely. This interest rate is used as a regulatory tool to control how freely the U.S. economy operates (Federal Bank of New York, n.d.).

### *LIBOR*

Today, LIBOR, London Interbank Offer Rate, is the most popular global benchmark for short-term interest rates, and represents \$200 trillion of financial contracts and securities. LIBOR is a benchmark introduced by the British Bankers' Association. It covers 5 currencies, which are US dollar, euro, Japanese Yen, British pound, and Swiss Franc. It also covers 7 maturity periods, which are overnight, one week, 1 month, 2 months, 3 months, 6 months and 1 year. Since 2014, LIBOR has been administered by ICE, Intercontinental Exchange. ICE collects quotes from major banks asking how much they will charge during the day for the interbank lending and calculates the LIBOR rates by taking the median of quotes after removing the top 25% and bottom 25%. The rates are published each morning at 11:00 London time.

The interbank borrowings and lendings that LIBOR represents are actually unsecured loans, meaning that these interbank borrowings are not backed by collaterals. Since it is not risk-free, the interest rate that commercial banks charge each other is also always higher than the base rates that the central banks have set. LIBOR has some downsides which allow commercial banks to manipulate the reference rates. The LIBOR rates are calculated based on banks' estimations, not real transactions. Therefore, commercial banks can give estimations that are lower or higher than what they actually are going to charge in order to manipulate the derivative market or give the market more or less confidence.

### *SOFR*

SOFR is Secured Overnight Financing Rate, which takes rates from the US treasury repo market that is much larger than the interbank loan market by Libor. Instead of covering multiple maturities, SOFR rate is simply one rate that measures the average actual interest rates of the US treasury repo market. Repo's are simply interbank loans backed with collaterals. SOFR is therefore also a secured reference rate, unlike LIBOR. The final calculation is therefore more accurate since it is based on data from observable transactions rather than estimated borrowing rates. At the same time, since any two institutions can enter into a repo transaction, and do not

have to report it anywhere apart from the balance sheet, SOFR is calculated only on the basis of transactions reported directly or indirectly (through custodians) to the Federal Reserve.

### *LIBOR Transition*

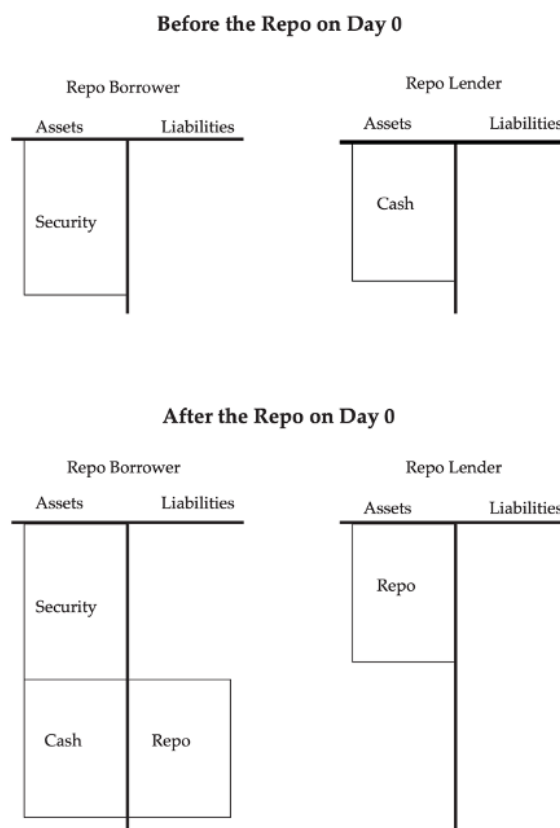
Because of the 2012 LIBOR scandal which has proven that the rate is vulnerable to manipulations by the surveyed banks, as well as the decreased volume in the unsecured transactions post-GFC, the financial industry is currently underway the transition from LIBOR to SOFR as a main benchmark rate. According to Congressional Research Service (2022), only last year there were still \$223 trillion of financial instruments referencing LIBOR. With LIBOR futures being the most traded financial instrument in the world, it is reasonable to assume that such an endeavor cannot be completed immediately. Thus, LIBOR's referencing is expected to cease completely only after June 2023.

## Repo Market

The Repo market is a fundamental element of the modern monetary system, and with the LIBOR transition being underway, it is expected only to gain importance. According to Comotto (2019), the global size of the market is estimated to be around \$16T, with \$3T of the overnight transaction volume. Because of its secured nature, the repo market has become a suitable tool for scaling the global dollar lending system, and after the 2008 Global Financial Crisis (GFC) it only gained importance, as the counterparty trust in the banking system substantially deteriorated. This, combined with additional regulations obliging the financial institutions to hold High-Quality Liquid Assets (HQLA) on their balance sheets, resulted in the Repo becoming the backbone of interbank financial flows

### *Mechanism of Work*

Even though the name “repo” is derived from “repurchase agreement”, its mechanism of work is rather a form of collateralized loan. When two parties engage in a repo transaction, the cash provider in some sense makes a purchase of the security – collateral in the transaction – with an agreement to resell it back to the other party once the transaction is complete. The transaction, however, is not a regular purchase transaction due to the idiosyncratic method of accounting – the collateral posted in the repo transaction never comes off the balance sheet of the repo borrower. The effect of the repo transaction on two parties’ balance sheets is depicted on a figure X.



Even though the collateral posted to the lender is accounted as a repo on their balance sheet, in many cases the repo lender is in control of the security for the duration of transaction and may have the right to re-pledge it in a different transaction, for example another repo. This gives the repo transactions very broad use, and certainly contributes to the outstanding size of the market. Because of multiple possibilities



with regards to security underlying in the transaction, engaging in repo from the reverse side (repo lender) may be motivated by the need for collateral rather than purely by profit. Figure X illustrates different economic functions (EF) of repo which may cause the parties to participate in the market.

(Cunliffe, 2019)

Economic functions of repo	Users of repo								
	Banks	Hedge funds	Money market funds	Insurers, pension funds	Long-only asset managers	Corporates	Public agencies	Central banks	CCPs
EF1. Low-risk option for cash investment	✓		✓	✓	✓	✓	✓	✓	✓
EF2. Transformation of collateral	✓	✓		✓				✓	
EF3. Supporting cash market efficiency and liquidity	✓	✓		✓				✓	
EF4. Facilitating hedging of risk	✓	✓		✓				✓	
EF5. Enabling monetisation of liquid assets	✓							✓	✓

### *Collateral in Repo Transactions*

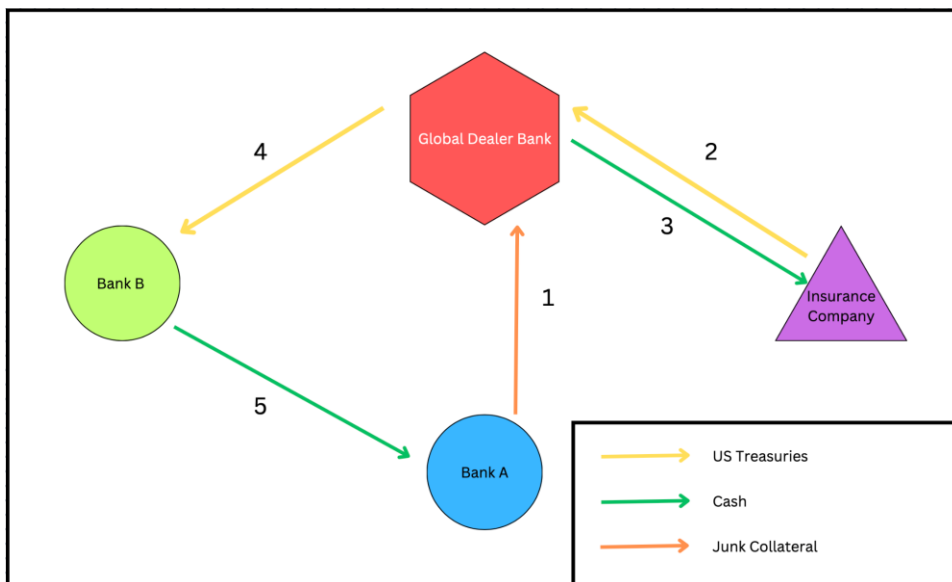
As the securitization of the repo plays a significant role in ensuring the elimination of the counterparty risk, availability of sufficiently good collateral is a fundament of a successful repo transaction. Security used as such should be relatively free of credit and liquidity risk, simultaneously be uncorrelated to the risk of counterparty pledging it (Comotto, 2019). Due to the broad range of securities that can be pledged resulting in different sets of risk tied to each type of collateral, as well as due to the fact that it is impossible to completely eliminate the risk resulting from the transaction, the repo borrower receives slightly less money than the value of securities he pledges in the transactions. This difference is called a *haircut* and works as a liquidity buffer for the repo lender in case of the borrower being unable to repurchase the security.

Naturally, the borrower in the repo transaction aims to obtain as low of a haircut as possible, as this maximizes the amount of money being made available for them. The party may do this by pledging the collateral of high quality. For the U.S. market, the vast majority of such collateral are the U.S. treasuries, TIPS, and the securities backed by government-sponsored agencies. Because of the U.S. government backing all of the above, their credit risk is

considered to be almost non-existent. Additionally, those assets are relatively liquid, which makes them easy to sell in case of the failure to receive the collateral at the end of repo transaction.

### *Threats Emerging from the Repo Market*

Because of the different functions of repo transactions, something that looks like one repo transaction at a first glance may involve several transactions and counterparties, each necessary to make the whole system work. Figure X illustrates a simplified example of a transaction between two banks, with a global dealer bank as an intermediary, and an insurance company as a provider of treasuries.



The example assumes that bank A wants to enter the repo transaction with bank B, however it is in possession of junk collateral which would not satisfy the counterparty. In order to obtain such, it posts the junk collateral to the global dealer bank (1). The dealer is in possession of the high-quality collateral, for example US Treasuries, as it received them in another repo transaction (2) from an insurance company which wants to earn an extra income (3) with its treasuries portfolio. The dealer bank may now post the treasuries to bank B, on behalf of bank A (4). In turn, bank B lends the cash to bank A (5) just as in case of a regular repo transaction.

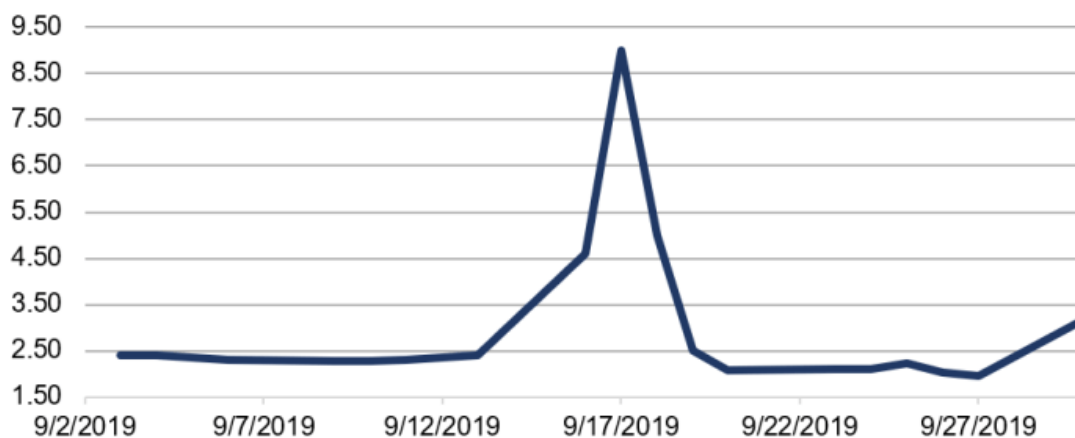
The example above illustrates that due to their versatile nature, the repo transactions may become very complicated and dependent on multiple counterparties at the same time. Because of the possibility of re-using the security for multiple transactions, the relationships between the participants of the repo market often look like long chains of financial flows, rather than the regular 1-on-1 transactions. Iyer and Macchiavelli (2017) proved that due to different forms

of re-pledging securities, failure to receive the securities by the dealer bank in the repo transaction has usually led to the failure to deliver almost the same amount of securities in another transaction. It may therefore be easily inferred that the faulty performance on one level of such a transaction chain may lead to a breakdown on a larger scale, especially if the cause is systemic and refers to the certain group of participants performing specific function in the market.

## Case 1 Repo 2019 crisis

As previously discussed, the Federal Reserve influences the market interest rate to achieve the range of the fund rate set by them. Therefore, main reference rates, including the overnight repo rate or so-called SOFR, should be in line with the fund rate. However, the Secured Overnight Financing Rate (SOFR) experienced on September 17 a sudden and unexpected spike. It increased from 2.43 percent on September 16 to 10 percent on September 17 (Cheng & Wessel, 2020). This unusual increase of repo rate also affected the interest rates on unsecured loans, namely EFRR. The spike of repo rate pushed EFRR above the fed funds rate, which was between 2 percent and 2.25 percent, to 2.30 percent (Schulhofer-Wohl, 2019).

Overnight Repo Rate (end-of-day)



Source: Federal Reserve/Haver



(Cheng & Wessel, 2020)

Due to this unusual activity in the repo market, the Federal Reserve Bank of New York implemented an emergency intervention. The Fed injected \$75 billion in liquidity into the repo markets on September 17 and continued to do so every morning for the rest of the week (Cheng & Wessel, 2020). On September 19, the Federal Reserve's Federal Open Market Committee also lowered the interest paid on bank reserves (Cheng & Wessel, 2020). These actions were ultimately successful in calming the markets and, by September 20, rates had returned to a stable level.

The sudden rise of repo rate can be simply explained by the mechanism of demand and supply: because of the sudden rise of the demand on short-term borrowings to meet the reserve requirement and too few treasury securities available to use as collateral, the borrower was willing to pay much higher interest rate on repo contracts. It is deemed that the increase of

demand for cash was caused by two events that coincided in mid-September 2019, namely quarterly corporate taxes were due, and it was the settlement date for previously-auctioned Treasury securities that buyers needed to transfer payment to the seller (Schulhofer-Wohl, 2019). Both of these actions resulted in a large amount of cash outflow from the financial market to the government, which finally led to an imbalance of demand and supply in the Repo Market. Schulhofer-Wohl (2019) has also explained the spill-over effect of the interest rate spike in Repo market to other unsecured short-term borrowing markets, such as fed funds. “Lenders in those markets now had the option to chase the high returns available in the repo market. In addition, when banks experience large outflows as a result of tax payments or Treasury issuance, they may seek to make up the money by borrowing overnight in the fed funds and other markets, putting additional pressure on rates there.”(Schulhofer-Wohl, 2019)

## **Case 2 Repo March 2020**

The turmoil in the repo market in March 2020 was largely driven by a sudden surge in demand for cash and safe assets amid the economic uncertainty and market volatility caused by the COVID-19 pandemic. As investors became increasingly concerned about the economic impact of the pandemic, they rushed to sell risky assets and hold cash and safe assets such as U.S. Treasury securities. This surge in demand for safe assets led to a shortage of thereof in the financial system, which in turn put pressure on its availability for repo transactions.

The repo market is a key source of short-term funding for many financial institutions, and the shortage of cash in the market made it more expensive for these institutions to borrow funds overnight. This, in turn, led to a spike in overnight lending rates, which reached unprecedented levels in some cases.

The Federal Reserve responded to the turmoil in the repo market by injecting large amounts of liquidity into the financial system through a series of open market operations, in which it purchased Treasury securities and other assets from financial institutions in exchange for cash. These actions helped to ease the strain in the repo market and stabilize short-term funding markets more broadly. In a speech given last year Governor Christopher J. Waller of the Federal Reserve Board discussed the Federal Reserve's asset purchases during the pandemic and considerations for the future. Waller highlights the Federal Reserve's decision to engage in large-scale asset purchases in response to the pandemic, which helped to stabilize financial markets and support the broader economy. He notes that the purchases were successful in lowering borrowing costs and supporting market functioning, which in turn helped to promote economic growth and job creation. However, Waller also discusses the potential risks associated with continued asset purchases, including the possibility of fuelling inflationary pressures and creating financial stability concerns. He suggests that the Federal Reserve must carefully monitor the economic and financial landscape and be prepared to adjust its policies as needed. Waller also discussed the importance of transparency and communication in guiding the public and ensuring that the Federal Reserve's policies are understood and supported. He emphasized the need for clear communication about the Federal Reserve's goals, strategies, and policy decisions, and suggested that continued outreach and engagement with the public can help to build trust and confidence in the central bank's actions.

## Recent events in the Repo market

Since the Global Financial Crisis a few recent developments have taken place in the Repo market:

1. **Increase in Demand for Repurchase Agreements:** The demand for repurchase agreements (repos) has been increasing due to various factors such as the need for short-term funding, regulatory requirements, and cash management by institutional investors.
2. **Regulatory Changes:** The Securities and Exchange Commission (SEC) proposed changes to the rules governing money market funds that invest in repurchase agreements. The proposed rules aim to improve the resilience of the funds during times of stress in the repo market.
3. **FICC's Sponsored Repo Program:** The Fixed Income Clearing Corporation (FICC) launched a sponsored repo program, which allows smaller firms to access the repo market by partnering with larger banks.
4. **Increase in SOFR Adoption:** The Secured Overnight Financing Rate (SOFR) has gained more adoption as a benchmark rate for the repo market, replacing the London Interbank Offered Rate (LIBOR), which will be phased out in the next few months.
5. **Fed's Reverse Repo (RRP) Facility:** The Federal Reserve established a reverse repo facility in 2013, which allows financial institutions to lend cash to the central bank in exchange for Treasury securities. The facility aims to provide an alternative investment option for excess cash in the market. In recent years this facility has started playing a larger role in the financial system. Additionally, due to the lack of counterparty and liquidity risk, the RRP facility is intended to act as a hard floor for the rates in the economy.

A standard repurchase agreement (repo) and a reverse repo are two sides of the same transaction, with the difference being the perspective of the parties involved.

In a standard repo, one party, typically a dealer or a bank, sells a security (often a government bond) to another party, such as a money market fund or a hedge fund, and agrees to repurchase the security at a later date at a higher price, which represents the interest on the loan. The buyer of the security provides cash to the seller, who uses it for short-term funding needs.

In a reverse repo, the same transaction occurs but from the perspective of the buyer of the security. In a reverse repo, a buyer, typically a money market fund, purchases a security from a dealer or a bank, and the seller agrees to repurchase the security at a later date at a higher price, which represents the interest on the loan. The seller provides cash to the buyer, who uses it as a short-term investment.

In summary, the key difference between standard repos and reverse repos is the perspective of the parties involved. In a standard repo, the seller of the security initiates the transaction and receives cash in exchange for the security, while in a reverse repo, the buyer of the security initiates the transaction and provides cash in exchange for the security.

In May of 2022 we saw a record of banks and funds stashing \$2tn overnight at Fed facility  
Investors in search of safe assets flock to the overnight reverse repo market.

Money market funds and banks parked a record \$2.04tn at the Federal Reserve's overnight reverse repurchase facility, highlighting the demand for safe-haven investments amid rising interest rates and market volatility. The figure was disclosed by the Federal Reserve Bank of New York and marks the first time that more than \$2tn had been placed at the facility. Although surging demand has previously been seen as a warning sign, this time it has not raised similar concerns, as funds and banks have few other appealing options to store their excess cash. The yield on Treasury bills is higher than the return from money market funds, meaning some investors looking for a place to store cash are bypassing money funds altogether.

In October of 2022 these developments started raising concerns. The International Capital Markets Association (ICMA) has sent an open letter to the European Central Bank (ECB) outlining concerns over "rising dysfunction" in the eurozone repo and money markets, which could lead to major market dislocations as interest rates are normalized. The ECB's quantitative easing programme led to a surplus of bank reserves but a scarcity of high-quality collateral in the financial system. The industry lobbying body has urged the ECB to consider two measures - the Fed's Overnight Reserve Repurchase Facility and the Swiss National Bank's issuance of tradable Treasury bills - to address the disequilibrium of excess liquidity and collateral scarcity.

Investors are continuously pouring trillions of dollars per day into the Federal Reserve's reverse repo facility, designed to soak up excess cash in the financial system, as they avoid volatile US government debt markets even as interest rates rise. Central bank officials and private analysts



expected money market funds to deploy cash to buy short-term US government debt now that it offers higher yields, but the heavy use of the Fed's reverse repo facility has confounded expectations. Higher levels of volatility in the Treasury bill market, boosted by swings in expectations for the Fed's monetary policy, have made parking cash with the central bank more appealing.

Recently there has been an increasing amount of cash being invested in US money market funds, which have drawn in over \$340bn since March 2022, due to the high returns offered by these funds compared to the interest rates offered by banks. Experts have warned that this shift into money market funds may further threaten the stability of the banking sector, particularly smaller regional lenders that cannot afford to increase the interest rates offered to account holders. Furthermore, much of the cash in money market funds ends up outside of the banking system altogether because the funds use a Federal Reserve facility that offers generous interest rates for parking cash overnight at the central bank. Concerns have been raised about the destabilizing potential of further flows, even once the central bank ends its monetary tightening and begins to lower borrowing costs.

To conclude, volatility in debt markets prompting money market funds and other large institutions to park cash in 'reverse repo' is starting to cause concern. Parties representing the bond market's biggest traders like the ICMA are warning of a 'rising dysfunction' in money markets.

## **Conclusion**

In conclusion, our analysis of the trading mechanisms of the reference rates and repo market and two recent cases of repo market failure has demonstrated a clear and a relatively significant relationship between interbank borrowing interest rates and the repo market. Despite SOFR has been touted as a more reliable benchmark for financial markets, the mechanisms of the repo market and these two cases suggest that the replacement of LIBOR by SOFR may expose interest rates to higher risks and volatility, particularly in the context of the repo market.

The repo market relies heavily on the availability of high-quality collateral to secure borrowing and lending transactions. However, the supply of such collateral can be subject to sudden shocks. As such, any disruption to the repo market could have significant knock-on effects for financial stability and the wider economy. Besides the supply of collateral, the complexities of the repo trading mechanism suggests that the transition may not be without its challenges, as multiple counterparties are often involved and the possibility of re-using collateral. Thus, SOFR may be subject to greater volatility compared to LIBOR. As such, central banks and markets may need to take additional steps to mitigate these risks.

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