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Research Report

Toss a stablecoin to your banker: Stablecoins' impact on banks' balance sheets and prudential ratios

ECB Occasional Paper, No. 353

Provided in Cooperation with:

European Central Bank (ECB)

Suggested Citation: Coste, Charles-Enguerrand (2024) : Toss a stablecoin to your banker: Stablecoins' impact on banks' balance sheets and prudential ratios, ECB Occasional Paper, No. 353, ISBN 978-92-899-6421-0, European Central Bank (ECB), Frankfurt a. M., <https://doi.org/10.2866/438165>

This Version is available at:

<https://hdl.handle.net/10419/301915>

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EUROPEAN CENTRAL BANK
EUROSYSTEM

Occasional Paper Series

Charles-Enguerrand Coste **Toss a stablecoin to your banker**

Stablecoins' impact on banks' balance sheets
and prudential ratios

No 353

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Abstract

This paper explores the relationship between banks and stablecoins and their issuers, focusing on the mechanical effects on banks' capital and liquidity ratios when issuing stablecoins or collecting deposits from stablecoin issuers.

The analysis reveals that converting retail deposits into stablecoin issuers' deposits weakens a bank's liquidity coverage ratio (LCR), turning a retail deposit into a wholesale deposit, even when these funds are reinvested in high-quality liquid assets. If a credit institution issues its own stablecoins, the impact on its LCR depends on whether it can identify the stablecoin holders; unknown holders weaken the LCR which could incentivise banks to issue stablecoins where they can continually identify the holders to benefit from more favourable liquidity treatment. Additionally, banks must either hold the reserves backing the stablecoins as central bank reserves or reinvest them in low-risk assets, making these funds a less effective source for economic financing and maturity transformation compared with traditional retail deposits. The study also finds that when retail customers of bank A buy a stablecoin issued by a non-bank that keeps reserves at bank B, both banks could see an unexpected decline in their liquidity ratios, as bank A loses stable retail deposits and bank B gains volatile wholesale deposits.

These insights are crucial to understanding the dynamics between banks and stablecoins in the evolving financial landscape.

JEL codes: E40, E42, E49, G11, G15, G18, G20, G21, G23, G28

Keywords: stablecoin, e-money, crypto-asset, MiCAR, bank, prudential regulation, bank's balance sheet

Non-technical summary

The paper delves into the dynamics between stablecoin issuers and credit institutions, exploring how deposits from stablecoin issuers affect banks' liquidity and capital ratios and thereby influence their risk profile. The key findings are summarised below.

- **Collecting deposits from stablecoin issuers transform retail deposits that can serve as a stable source of funding for banks into volatile deposits that cannot.** Deposits from stablecoin issuers need to be kept by banks as central bank reserves or reinvested in low-risk assets, meaning that these deposits generally serve as a less efficient source of funding than retail deposits for banks to fulfil their economic function of financing the economy and maturity transformation.
- **When a credit institution collects deposits from stablecoin issuers, and treats them as unsecured wholesale funding, it always weakens its liquidity coverage ratio (LCR)** even if the bank reinvests them in high-quality liquid assets, due to the 100% outflow rate of these deposit.
- **When a credit institution issues its own stablecoins but cannot identify the stablecoin holders, it also weakens its LCR** by treating the liabilities as unsecured wholesale funding with a 100% outflow rate.
- **However, when a credit institution issues its own stablecoins and can identify the holder type, it can apply the appropriate outflow rate for that category, which will generally be beneficial when holders are retail.** This could incentivise banks to issue stablecoins with mechanisms that allow for the continuous identification of holders, to benefit from more advantageous liquidity requirements.
- **When retail customers of bank A buy stablecoins issued by a non-bank issuer who keeps reserves in bank B, both banks may unexpectedly see their liquidity ratios weaken.** Even though creating the stablecoins only shifts liquidity between banks without changing the amount of liquidity within the banking sector, bank A sees a reduction in its retail deposits (a stable deposit source) while bank B sees an increase in its wholesale funding (a non-stable source of funding).
- **The fact that banks need to reinvest deposits from stablecoin issuers in low-risk assets to maintain their liquidity targets means that collecting such deposits should have little to no impact on their risk-weighted capital ratio but could weaken their leverage ratio.** Furthermore, collecting deposits from stablecoin issuers is a liability-driven activity that mainly depends on clients' activity rather than banks' own balance sheet management.

1 Introduction

1.1 Electronic money, stablecoins and E-money tokens

Electronic money (e-money) is defined as an electronic store of monetary value on a technical device that may be widely used for making payments to entities other than the e-money issuer.¹ E-money issuers are prohibited from remunerating clients², and the issuance of e-money is not considered to be a deposit-taking activity³. Consequently, e-money instruments do not fall within the scope of a deposit guarantee scheme.⁴ Traditional e-money payment instruments are book-entry, meaning that their ownership is recorded electronically in the books of the issuer. Ownership of these instruments is transferred by changing the records in the issuer's books.

A stablecoin is defined as a cryptoasset that aims to maintain a stable value relative to a specified asset, or a pool or basket of assets⁵. While currently occupying only a niche in the financial landscape⁶, stablecoins can represent the application of blockchain technology to traditional concepts of currency. By anchoring their value to “real-world” assets such as fiat currencies or commodities, they aim to combine the characteristics of token payments on the ledger on which they are issued, which are claimed to be fast, low-cost transactions offering pseudonymity and/or decentralisation, with the stability of traditional currencies, thereby reducing the price volatility typically associated with crypto-assets. Stablecoins are digital bearer payment instruments, meaning that no ownership information is recorded by the issuer. The holder of a stablecoin is presumed to be the owner, and whoever is in possession of the coin is entitled to its rights.

In the European Union, under the Markets in Crypto-Assets Regulation (MiCAR), the generic term “stablecoins” can usually refer to two distinct types of assets.

- **Electronic money tokens (e-money tokens or EMTs) are a type of crypto-asset that purport to maintain a stable value by referencing the value of**

¹ See [ECB definition](#).

² E-money issuers are prohibited from paying interest on e-money deposits to help distinguish their services from traditional banking, where interest-bearing deposits are regulated. ([reference 1](#) and [reference 2](#)). This separation helps prevent e-money providers from engaging in full-fledged risk-taking banking activities. By maintaining this distinction, regulatory authorities can uphold financial stability and protect consumers while promoting a clear separation between e-money services and traditional banking operations. Prohibition is stipulated in Directive 2009/110 EC (E-Money Directive). The payment of interest to e-money holders is prohibited in most jurisdictions over the world.

³ Recital 13 of the E-Money Directive.

⁴ Recital 29 of Directive 2014/49/EU on deposit guarantee schemes.

⁵ See [See FSB definition](#).

⁶ As of 4 December 2023, the size of the stablecoin market was estimated at around €120 billion, including €274 million in euro ([link](#)). This estimation is not based on the regulatory status of the instruments. For comparison, the size of the combined M2 money supply of the four largest central banks (USA, EU, JP, CN) is estimated at around €78 trillion ([link](#)).

an official currency. The regulation establishes clear rules for EMT issuers, which must be authorised as a credit institution or an e-money institution.⁷

- **Asset-referenced tokens (ARTs), on the other hand, are a type of crypto-asset other than EMTs and that purport to maintain a stable value by referencing another value or right or a combination of assets thereof** (including fiat currencies, commodities, or other crypto-assets).

Both EMTs and ARTs are subject to specific requirements under MiCAR to ensure their stability and transparency as well as the protection of holders.

Issuers are required to hold reserves at least equal to the funds received or the monetary value of the EMTs or ARTs issued.

In the context of this paper, the term “stablecoin” is used to underscore that the conclusions should be consistent in jurisdictions with a regulatory framework aligned with Basel recommendations. In the EU context, the term “stablecoin” as used in this paper would more refer to EMTs issued by banks and/or by e-money institutions⁸. The issuing of EMTs and their interaction with traditional banking systems form an interesting juncture for exploration in terms of their prudential impact on banks’ balance sheets and financial stability.

1.2 Impact of stablecoin issuance on banks’ balance sheets





In the following section, we will illustrate how a stablecoin acquisition by a retail client from the issuer affects the balance sheets of all involved entities.

We will trace the flow of assets and liabilities from the stablecoin issuer and its bank to the stablecoin acquirer and its bank, revealing the financial implications of stablecoin transactions under the simplifying assumptions that when the stablecoin issuer is not a bank, it keeps all its reserve assets as bank deposits and the bank keeps these deposits in central bank reserves.

1.2.1 When the stablecoin issuer is a bank

Figure 1

Change in the balance sheet of a stablecoin issuer (a bank) selling stablecoins on the primary market to one of its own clients and backing stablecoins with its balance sheet

Stablecoin issuer (bank)		Stablecoin acquirer	
Assets	Liabilities	Assets	Liabilities
No change	 Bank deposits  Stablecoin	 Bank deposits  Stablecoin	No change

⁷ In line with [Article 43 MiCAR](#).

⁸ EMTs must hold at least 30% of their reserves as deposits in credit institutions.

The stablecoin issuer issues new tokens when acquirers buy these tokens from the issuer, typically in a fiat currency like the US dollar or euro. When a stablecoin issuer is a bank and sells stablecoins to its own client, the process is very simple. The client purchases stablecoins using its own deposits at the bank, meaning:

- the bank has no change in the total amount of assets it holds, only a change in the structure of its liabilities;
- the client similarly does not see any change in the amount of assets it holds at the bank, only a change in the structure of these assets.

1.2.2 When the stablecoin issuer is a not a bank

Figure 2

Evolution of the balance sheet of a stablecoin acquirer and its bank when the stablecoin acquirer buys stablecoins on the primary market⁹









Stablecoin acquirer's bank		Stablecoin acquirer	
Assets	Liabilities	Assets	Liabilities
 Central bank reserves	 Bank deposits from retail client	 Bank deposits  Stablecoin	No change

Figure 3

Evolution of the balance sheet of a stablecoin issuer (non-bank) and its bank when the stablecoin issuer sells stablecoins on the primary market

Stablecoin issuer's bank		Stablecoin issuer (non-bank)	
Assets	Liabilities	Assets	Liabilities
 Central bank reserves	 Bank deposits from stablecoin issuer	 Bank deposits	 Stablecoin

When a stablecoin issuer is not a bank and sells stablecoins to the public, the process involves the following steps.

- The client acquires stablecoins by transferring its funds from its own bank to the bank of the stablecoin issuer. In return, the client receives stablecoins. This

⁹ The example shows the balance sheet evolution at the time of the acquisition, not the evolution of the deposits over the entire life cycle. The issuer may subsequently decide to buy HQLAs with these deposits.

results in a change in the structure of the client's assets, but the total amount of assets remains unchanged.

- The bank of the stablecoin acquirer experiences an outflow of funds as the client's deposit leaves the bank. This leads to a corresponding reduction in central bank reserves¹⁰, since the bank needs to transfer its central bank reserves to the bank of the stablecoin issuer.
- The stablecoin issuer receives funds from the stablecoin acquirer in their bank account. In response, the issuer issues similar liabilities in the form of newly issued stablecoins.
- The bank of the stablecoin issuer sees an increase in its liabilities because the stablecoin issuer's deposits have increased. Simultaneously, the bank experiences an increase of its reserves at the central bank, which correspond to the reserves received from the bank of the stablecoin acquirer¹¹.

¹⁰ Under the simple assumption that the bank uses its existing central bank reserves and does not need to sell other assets to meet withdrawals.

¹¹ The scale of the reserve increase could be transient, as the stablecoin issuer may reallocate some of the deposits to acquire low-risk assets.

2 Interplay between stablecoin issuers' deposits and banks' liquidity coverage ratio

2.1 How deposits from stablecoin issuers feed into banks' liquidity constraints

Stablecoins regulated as payment instruments are designed to serve as transaction mediums rather than long-term savings mechanisms. This characteristic makes it imperative that the reserves backing stablecoins are not only stable to ensure value preservation, but also liquid to enable immediate and seamless client redemptions. To meet these criteria, stablecoin issuers must place their reserves in liquid, low-risk assets that can withstand sudden high redemption demands. Under MiCAR, at least 30% of these assets must be in bank deposits if the stablecoin issuer is an e-money institution¹².

- **When the bank is the stablecoin issuer, liquidity risk stems from outflows related to clients' redemptions and subsequent withdrawals.**
- **By contrast, when the bank is not the stablecoin issuer but instead provides banking services to the stablecoin issuer, liquidity risk stems from outflows related to issuers' withdrawals**, either (i) because of the issuer's own decision (e.g. a decision to invest some deposits in other low-risk assets or transfer them in another bank) or (ii) because of stablecoin holders' redemption and subsequent withdrawal requests.

Banks face minimum liquidity requirements imposed by the liquidity coverage ratio (LCR)¹³, which serves as measure of a bank's ability to meet its short-term liquidity needs during stressed conditions. The LCR is designed to ensure that banks maintain sufficient high-quality liquid assets (HQLAs) to meet their liquidity needs under a 30-day stress scenario.

Through the LCR, regulators aim to ensure that banks maintain an adequate buffer of HQLAs, enabling them to withstand unforeseen market disruptions, sustain their operations and fulfil their obligations to depositors and creditors. Compliance with the minimum LCR is crucial to safeguarding financial stability and enhancing the resilience of the banking system.

LCR stressed outflows are calculated based on predefined outflow rates assigned to different types of funding sources. For example, retail deposits which tend to be rather sticky on an aggregate basis are typically assigned a 5% to

¹² Article 54 of Regulation (EU) 2023/1114 on markets in crypto-assets (MiCAR)

¹³ Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for credit institutions ([link](#)).

10% outflow rate¹⁴, operational deposits of financial institutions held for clearing are assigned a 25% outflow rate¹⁵, and unsecured wholesale funding which tends to be very volatile is typically assigned a 100% outflow rate¹⁶, indicating that the entire amount is expected to leave the bank under a stress scenario. Simply put, the higher the outflow rate, the higher the risk the deposits will leave the bank during a crisis and the more of these should therefore be reinvested in liquid assets. The LCR is computed as follows:

$$\text{LCR} = \text{HQLAs} / \text{total net outflows over 30 days}$$

where net outflows = gross outflows – gross inflows (capped at 75% of gross outflows¹⁷). The LCR should always be above 100%.

Banks are required to hold sufficient liquid assets, such as cash, central bank reserves or high-quality government bonds, to cover these assumed outflows¹⁸. By adhering to the LCR, banks enhance their liquidity risk management and contribute to the stability of the financial system.

2.2 Qualifying outflow rates for stablecoin liabilities when the bank is the stablecoin issuer¹⁹

The initial Basel III LCR standards from 2013²⁰ and the 2016 EU delegated regulation implementing the LCR²¹ did not assign specific outflow rates for stablecoins. At that time, the market for stablecoins was too small to warrant distinct outflow rates in these standards.

In 2022 the BCBS issued a standard on the prudential treatment of banks' crypto-asset exposures²² stipulating that the treatment of crypto-liabilities should be based on their commercial function and the nature of the bank's exposure and set that banks must assign LCR outflow rates based on the

¹⁴ Articles 24 and 25 of Delegated Regulation (EU) 2015/61

¹⁵ Article 27 of Delegated Regulation (EU) 2015/61

¹⁶ Article 27 of Delegated Regulation (EU) 2015/61

¹⁷ Except for outflow rates for very specific business models, in line with Articles 33 of Delegated Regulation (EU) 2015/61

¹⁸ Some less liquid assets (e.g. some asset-backed securities or ABS also count as HQLA, but are subject to high "LCR haircuts" in the calculation of the HQLA amount. For simplicity, all references to HQLAs in this paper assume no haircut unless explicitly stated otherwise.

¹⁹ Banks issuing EMTs can either back the stablecoins via a separate/bankruptcy remote special purpose vehicle that has direct claims on the underlying assets or, alternatively, with their own balance sheet and treat them like traditional e-money. The following section discusses banks issuing EMTs and backing them via their own balance sheet. As per Recital 66 MiCAR, issuers of e-money tokens should be authorised either as a credit institution under Directive 2013/36/EU (CRD IV) or as an electronic money institution under Directive 2009/110/EC. E-money tokens should be deemed to be "electronic money" as defined in Directive 2009/110/EC, and their issuers should, unless specified otherwise in this regulation, comply with the relevant requirements set out in Directive 2009/110/EC for the taking up, pursuit and prudential supervision of the business of electronic money institutions and the requirements on issuance and redeemability of e-money tokens.

²⁰ Basel III: the liquidity coverage ratio and liquidity risk monitoring tools.

²¹ Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for credit institutions ([link](#)).

²² BCBS prudential treatment of cryptoasset exposures ([link](#)).

earliest date upon which a liability could be redeemed. This approach aligns the LCR outflow rates of group 1a²³ crypto-liabilities with those of traditional non-tokenised liabilities, considering the earliest redemption date and the type of client when this information is available, or apply a conservative treatment²⁴ when banks are unable to identify the client.

In the EU, traditional e-money issued by credit institutions is already treated as liabilities to the respective client's type for LCR purposes. Banks apply outflows depending on the customer type (e.g. retail or non-financial corporate) in accordance with Article 22 of the LCR Regulation and the recommendation of the European Banking Authority (EBA)²⁵, therefore the BCBS standard for group 1a crypto-liabilities overall seems to align with the existing EU treatment of banks' traditional e-money liabilities.

Banks need to continually identify the holders of EMTs over their life cycle to benefit from less conservative liquidity treatment. This continuous monitoring is only possible in an ecosystem where the bank has information on the ultimate client's client, for example because the stablecoin is issued on a permissioned distributed ledger technology (DLT) where the bank knows who the clients are, or when the issuer implements whitelisting on a permissionless DLT. Conversely, issuers have little to no information about the end user/current holder when issuing non-whitelisted stablecoins on a permissionless blockchain and therefore may have to apply a conservative 100% outflow rate. A detailed simulation of the quantitative impact of different requirements is provided in Section 2.3.2.

Stablecoins deployed on distributed ledgers with smart contracts can be programmed with custom rules and functionality. For example, they can be locked and made unredeemable within specific periods, such as the LCR period (30 days) which would reduce redemption risk for the issuer²⁶ as the stablecoin may not be transferable and redeemable during this period.

One could imagine that stablecoins which cannot be redeemed within 30 days could potentially warrant the same 0% outflow rate LCR treatment as other bank liabilities that clients are not allowed to withdraw within 30 days.

Specifically, encumbered and unredeemable stablecoins – such as those locked in smart contracts that cannot be redeemed within the next 30 days – could be considered accordingly in liquidity requirements. The holder must not recognise inflows in the LCR denominator if the crypto-asset is not redeemable within 30 days.

²³ Under the Basel crypto-asset standard, banks are required to classify crypto-assets on an ongoing basis into several groups:
- group 1 crypto-assets include tokenised traditional assets (Group 1a) and crypto-assets with effective stabilisation mechanisms (Group 1b) complying with a set of classification conditions;
- group 2 crypto-assets include those that fail to meet any of the classification conditions.

²⁴ Treating the liability as wholesale funding provided by other legal entity customers (100% outflow rate).

²⁵ See [EBA Q&A](#).

²⁶ Stablecoins can be locked using smart contracts – in order to provide collateral for lending and borrowing, participate in yield farming or access decentralised applications – or as tokenised stablecoins representing a claim on locked stablecoins that can be reused as collateral by market participants.

2.3 Qualifying outflow rates for liabilities stemming from the provision of banking services to non-bank stablecoin issuers

When banks provide banking services to stablecoin issuers, they are exposed to risks stemming from the issuer's activity. One important risk is the liquidity risk stemming from the issuer's activity and from the issuer's client activity, which banks need to adequately account for. While there is currently no specific treatment for the provision of such services to stablecoin issuers, such as taking deposits, this section discusses their treatment in line with current LCR rules.

In the case of deposits from stablecoin issuers, their resemblance to deposits from other financial institutions could justify similar treatment. In the EU, regulated stablecoin issuers²⁷ need to maintain large deposit balances with credit institutions to facilitate smooth redemption processes, just as money market funds need to hold deposits for various operational and service-related purposes. Considering the behaviour and operational needs of stablecoin issuers, there may be reasons to treat deposits from stablecoin issuers like deposits from financial institutions for LCR purposes. This approach would ensure consistency in assessing liquidity risk and enable banks to appropriately manage their liquidity position in relation to stablecoin issuers.

For the LCR, deposits from stablecoin issuers could be characterised as (i) operational deposits from financial institutions or (ii) non-operational deposits from financial institutions.

- **Operational deposits from financial institutions, maintained for clearing, custody, cash management or similar services, receive a favourable 25% outflow rate within the context of an established operational relationship not covered by a deposit guarantee scheme.**²⁸ These deposits are subject to extensive legal or operational limitations that make significant withdrawals within 30 calendar days unlikely. Any funds exceeding those necessary for the provision of operational services are treated as non-operational deposits.
- **Non-operational deposits from financial institutions, including excess deposits held by clients on top of what they effectively need for the services described above, are such that banks holding them cannot rely on them during financial stress periods, making them unsuitable as a stable funding source.** Banks are therefore required to hold liquid assets against these deposits, which traditionally receive a 100% outflow rate under the LCR.

The failure of Silicon Valley Bank in March 2023²⁹ may suggest that stablecoin issuers will actively attempt to withdraw their entire deposits from an institution perceived to be in distress. This incident underscored the fact that

²⁷ E-money institutions.

²⁸ See [EBA C 73.00](#) – liquidity coverage – outflows.

²⁹ See Elder, B. (2023).

despite operational and financial obstacles, issuers prioritise safeguarding their capital and their clients' assets. By recognising that stablecoin issuers may seek to pursue full withdrawal in times of financial stress, a 100% outflow rate acknowledges the need for banks to hold adequate liquid assets against these deposits, reinforcing the importance of resilience and risk management within the LCR framework.

Essentially, stablecoin issuers' deposits face significant short-term outflow risk and are therefore not an effective source of funding for banks. They inflate a bank's balance sheet without providing resources it can use for lending activities and, under a high-stress scenario, they could exit the bank entirely. Assigning them a 100% outflow rate would therefore require banks to hold an equivalent amount of HQLAs.

2.3.1 Liquidity coverage ratio: illustrated impact

The following section provides detailed mechanics on how and to what extent issuing a stablecoin or onboarding deposits from stablecoin issuers affects a bank's LCR based on the three possible outflow rates, representing³⁰:

1. a bank issuing a stablecoin for retail clients where it can identify the ultimate retail client and assigns an outflow rate of 10%³¹, corresponding to the outflow rate of retail liabilities;
2. a bank onboarding a stablecoin issuer and assigning an outflow rate of 25%³², corresponding to a client's operational deposit generated by clearing, custody and cash management activities;
3. a bank issuing a stablecoin and being unable to identify the ultimate client or onboarding a non-bank stablecoin issuer and assigning an outflow rate of 100%³³, both corresponding to the outflow rate of unsecured wholesale funding provided by other legal entity customers.

2.3.2 Initial situation

To illustrate the impact of the LCR, consider a bank with €1 billion in HQLAs and €800 million in net outflows. Initially, this bank's LCR is 125%.

³⁰ In all three scenarios, we adopt the simplifying approach that the client deposits used to purchase the stablecoin were held with other banks, not with the issuing bank. This results in new deposits being collected by the bank, rather than substituting deposits within the same bank.

³¹ Under the Basel standard on crypto-assets, EMTs could fall under group 1a, i.e. tokenised traditional assets, as e-money is a traditional asset. In this case, Article 60.107 specifies treatment in line with BCBS LCR 40 – treatment as less stable deposits (run-off rates under LCR 40.13 and 40.14) applicable to retail deposits not covered by a deposit guarantee scheme – for which an outflow rate of 10% would apply.

³² In line with BCBS LCR 40.26: treating the liability as operational deposits generated by clearing, custody and cash management activities.

³³ In line with BCBS LCR 40.42: treating the liability as wholesale funding provided by other legal entity customers.

$$\text{LCR} = \text{HQLAs} / \text{total net outflows} = \text{€1 billion} / \text{€800 million} = 125\%$$

2.3.2.1 Illustrative impact with a 10% outflow rate

The bank issues €200 million in stablecoin liabilities and sells them to new clients. For the sake of simplicity, all the proceeds collected are assumed to be held as reserves at the central bank. The operation increases both its liabilities and its reserves by €200 million. The bank's LCR changes depends on the outflow rate assigned to the new deposits.

In this case, we assume that the bank can identify its clients as retail clients and assigns a 10% outflow rate to these new liabilities.

The bank's HQLAs increase by €200 million (it receives €200 million of central bank reserves), and its total net outflows increase by €20 million (€200 million in liabilities x 10% outflow rate = €20 million).

$$\text{LCR} = \text{HQLAs} / \text{total net outflows} = (\text{€1 billion} + \text{€200 million}) / (\text{€800 million} + \text{€20 million}) = \text{€1.2 billion} / \text{€820 million} = 146\%$$

The operation leads to an increase in the bank's LCR from 125% to 146%. The bank now exhibits a stronger short-term liquidity position because it holds more retail funding, which usually improves a bank's liquidity position.

2.3.2.2 Illustrative impact with a 25% outflow rate

Second, we take an example where instead of the bank issuing the stablecoins, it is an external issuer, and the bank provides banking services to this issuer.

The stablecoin issuer collects €200 million from clients and keeps them at the bank, which in turn keeps them as reserves at the central bank.

As in the previous example, the operation increases the bank's liabilities and its reserves by €200 million. This time, however, we assume that the €200 million deposit is assigned a higher 25% outflow rate, corresponding to operational deposits generated by clearing, custody and cash management activities.³⁴

The bank's HQLAs increase by €200 million (it receives €200 million of central bank reserves) but, this time, its total net outflows only increase by €50 million (€200 million x 25%), resulting in an improved LCR of 141%.

$$\text{LCR} = \text{HQLAs} / \text{total net outflows} = (\text{€1 billion} + \text{€200 million}) / (\text{€800 million} + \text{€50 million}) = \text{€1.2 billion} / \text{€850 million} = 141\%$$

³⁴ Operational deposits are defined as deposits with a bank in order to facilitate clients' access and ability to use payment and settlement systems and otherwise make payments.

The operation improves the bank's LCR from 125% to 141%, less than in the first example because these liabilities are assumed to be more volatile compared with selling stablecoins to retail clients.

2.3.2.3 Illustrative impact with a 100% outflow rate

Finally, we take the same initial situation as above but instead assign a 100% outflow rate, which can correspond to the bank issuing stablecoins and being unable to identify the holder or to the deposits of a stablecoin issuer being assessed as wholesale unsecured funding.

Like the two previous examples, the €200 million deposit received by the bank is held at the central bank as reserve assets. However, we assign them a 100% outflow rate. The bank's HQLAs increase by €200 million (it receives €200 million), and its total net outflows also increase by €200 million (new deposits from the stablecoin issuer assigned a 100% outflow rate).

$LCR = \text{HQLAs} / \text{total net outflows} = (\text{€1 billion} + \text{€200 million}) / (\text{€800 million} + \text{€200 million}) = \text{€1.2 billion} / \text{€1 billion} = 120\%$

The operation has mechanically led to a slight decrease in the bank's LCR from 125% to 120%, and the bank now exhibits a slightly weaker short-term liquidity position.

2.3.2.4 Detailed explanation

In the first example, the LCR of the bank mechanically improves from collecting deposits that benefit from a low outflow rate and investing in HQLAs because the numerator increases by more than the denominator of the ratio, mechanically moving the bank's LCR higher. Under this scenario, collecting stablecoin issuer deposits becomes a way for the bank to improve its liquidity position due to the beneficial outflow rate.

Conversely, in the last example, the LCR of the bank mechanically weakens from collecting deposits because when both the numerator and denominator of a ratio are increased by the same amount, the ratio tends to converge towards one. This convergence is rooted in the proportional relationship that exists between the numerator and denominator. When we increase both parts of the fraction by the same amount, the relative difference between the numerator and denominator shrinks. As a result, the ratio moves closer to equality, signified by the value 1 (or 100%), which could be perceived as weakening the bank's overall liquidity resilience.

Setting a 100% outflow rate pushes a bank's LCR towards 100% because it weights both the numerator and the denominator of the ratio towards 100%. Paradoxically, the bank holds more liquid assets, but its LCR moves closer to the 100% regulatory minimum mark, which is generally perceived as a weaker liquidity position. In practical terms, the impact on a bank depends on the proportion of its

deposits from stablecoin issuers relative to its total funding, highlighting the importance of banks maintaining diversified funding sources³⁵.

Banks aim for an LCR above 100% to buffer against potential liquidity shocks.

However, for each unit of stablecoin issuers' deposits, the best a bank can achieve is a 100% LCR, given that these deposits mandate a one-to-one backing with HQLAs.

Just taking the LCR, assuming an outflow rate of 100% would effectively make it comparatively easier for banks with ample excess liquidity to onboard stablecoin issuers' clients,

as the weaker LCR would not pose direct constraints. Conversely, it may be less attractive for banks exhibiting weaker short-term liquidity ratios to onboard stablecoin issuers' clients, as this could translate into higher costs to comply with LCR.

2.3.3 Systemic impact of converting large volumes of retail deposits into stablecoin deposits

When a bank collects deposits from non-bank stablecoin issuers³⁶, the transfer of deposits within the banking system remains neutral, as all deposits remain within the system.

However, the liquidity situation of the banking system, which includes both the banks' facing outflows, and those facing inflows, may deteriorate. This is because banks experiencing outflows lose retail deposits, which are a stable source of funding, while banks receiving inflows gain deposits from the stablecoin issuer³⁷, which are not as stable, and require that banks hold higher HQLA reserves to cover for potential outflows.

A similar impact was noted with the expansion of e-money schemes in China.

According to Sun and Rizaldy (2023), before the 2017 payment reform, the rapid growth of Alipay and WeChat Pay shifted a substantial amount of small retail deposits from the broader banking sector into wholesale deposits concentrated in a few banks. This development, assessed by the People's Bank of China (PBOC) as increasing systemic risk, prompted the reform that mandated systemic payment institutions to maintain reserves for client e-money balances at the PBOC.

In practice, if stable deposits in bank A are converted into stablecoins issued by a non-bank financial institution keeping its reserves as deposits in bank B, this may weaken the LCR of both banks, as illustrated in the example below.

³⁵ The 2022 SSM supervisory priorities further highlight the need for banks to have diversified funding.

³⁶ Or issues stablecoins assigned a high outflow rate because it is unable to continuously identify the end-user.

³⁷ Deposits from stablecoin issuers are classified as a financial sector deposit.

Let us assume banks A and B have the same balance sheet structure:

- a balance sheet of €100 billion;
- €10 billion in HQLAs;
- €90 billion in loans (non-liquid assets);
- €100 billion in retail deposits (5% outflow rate under the LCR).

Banks A & B (before the transfer)

Assets		Liabilities and equity	
HQLAs (reserves)	€10 billion	Retail deposits (5% outflow rate)	€100 billion
Illiquid loans	€90 billion		
Total assets	€100 billion	Total liabilities and equity	€100 billion
LCR = €10 billion / (€100 billion x 0.05) x 100% = 200%			

Now let us imagine that 5% of bank A's clients buy stablecoins from an issuer that keeps the deposits backing the stablecoin in bank B, assuming no other changes and that the stablecoin is 100% backed by bank deposits. This would result in a transfer of €5 billion in retail deposits from bank A to bank B, which would become financial sector deposits in the same amount with a corresponding transfer of reserves from bank A to bank B.

The LCR of both banks would decrease as follows:

Bank A (after the transfer)

Assets		Liabilities and equity	
HQLAs (reserves)	€5 billion (-€5 billion)	Retail deposits (5% outflow rate)	€95bn (-€5 billion)
Illiquid loans	€90 billion		
Total assets	€95 billion (-€5 billion)	Total liabilities and equity	€95bn (-€5 billion)
Total net cash outflows = retail deposits * 5%			
Total net cash outflows = €95 billion x 5% = €4.75 billion			
LCR = (€5 billion / €4.75 billion) x 100% = 105.26% ³⁸			

³⁸ For simplification purpose, the simulation assumes that the bank uses its HQLA to meet its withdrawals and does not sell less liquid loan portfolios.

Bank B (after the transfer)

Assets		Liabilities and equity	
HQLAs (reserves)	€15 billion (+€5 billion)	Retail deposits (5% outflow rate)	€100 billion
Illiquid loans	€90 billion	Deposits from financial institutions (100% outflow rate)	€5 billion (+€5 billion)
Total assets	€105 billion (+€5 billion)	Total liabilities and equity	€105 billion (+€5 billion)

Total net cash outflows = (5% * retail deposits) + (100% * deposits from financial institutions)

Total net cash outflows = (€100 billion x 5%) + (€5 billion x 100%) = €5 billion + €5 billion = €10 billion

LCR = (€15 billion / €10 billion) x 100% = 150%

For bank A, the LCR decreases because the amount of HQLAs, in this case the reserves, decreases from €10 billion to €5 billion due to the €5 billion outflow to bank B. However, the net cash outflow also falls slightly due to a drop in retail deposits from €100 billion to €95 billion. Still, the decrease in HQLAs is larger in comparison to the decrease in net cash outflows, leading to the drop in the LCR.

For bank B, even though it receives an inflow of €5 billion, increasing its HQLAs from €10 billion to €15 billion, its LCR also decreases. This is because the €5 billion inflow comes from financial institutions, which is considered as a deposit with a 100% outflow rate according to LCR calculations. This inflow effectively increases the bank's total expected net cash outflows over the next 30 days from €5 billion (5% of €100 billion in retail deposits) to €10 billion (5% of €100 billion in retail deposits + 100% of €5 billion deposits from non-financial institutions).

It might seem counter-intuitive for bank B's LCR to decrease even when its HQLAs increase because an increase in liquid assets should increase the LCR, at least in isolation. However, the LCR also factors in the expected cash outflows, and, in this case, the added deposits from financial institutions are associated with a much higher expected outflow rate, which has a greater effect on the LCR than the increase in HQLAs. As a result, even with more liquid assets, bank B is considered less liquid according to the LCR because of its increased expected cash outflows.

This weakening of the LCR may be perceived as a deterioration of a bank's liquidity position, particularly under a crisis scenario. If market participants observe that both bank A and bank B continue to exhibit a weaker LCR, it could potentially trigger stress on bank A and be perceived as having a contagion effect on bank B, potentially contributing to broader instability.

3 Effects on banks' capital ratio from receiving deposits from stablecoin issuers

3.1 How deposits from stablecoins issuers feed into banks' capital constraints

Banks face two primary types of capital constraints: the risk-weighted capital ratio and the non-risk-weighted capital ratio (also known as the leverage ratio). The proportion of risk-weighted assets (RWAs) relative to total assets is known as RWA density. Consider a bank with a minimum leverage ratio requirement of 3% and a minimum capital ratio requirement of 8%, which for simplicity is also assumed to be based on Tier 1.³⁹ This means that the bank's Tier 1 capital must represent at least 3% of its total leverage exposure⁴⁰ (for the leverage ratio) and 8% of its RWAs (for the Tier 1 capital ratio).

If a bank's RWA density is high, meaning it holds a large proportion of risky assets, it will primarily be constrained by the Tier 1 capital ratio. The bank's RWAs would need a higher amount of Tier 1 capital buffer to satisfy the 8% requirement compared with a bank holding mainly low-risk assets. This means a bank may struggle to expand its activities involving higher RWAs without breaching this capital requirement or needing to raise more capital.

Conversely, if a bank's RWA density is low, meaning it holds a large proportion of low-risk assets, it will primarily be constrained by the leverage ratio. The 3% leverage ratio requirement applies to the bank's exposures without weighing them with their risk weights. Consequently, even acquiring more low-risk assets such as central bank reserves or government bonds would require a certain amount of Tier 1 capital to meet the leverage ratio requirement.

The explanation below provides an indicative illustration of how collecting stablecoin deposits may mechanically affect banks' balance sheets.

³⁹ 8% and 3% are used for illustration purposes. In practice, banks must comply with a Tier 1 regulatory minimum of 6% plus P2R, G-SIB buffer, O-SII buffer, systemic risk buffer, countercyclical buffer and capital conservation buffer, which are mostly made of CET1 and therefore increase the need for Tier 1 capital. They also must comply with a leverage ratio requirement of 3% plus GSII buffer and bank-specific P2R. The exact requirements pertaining the quality of additional own funds requirements Article 104(a) of CRD ([link](#))

⁴⁰ The leverage ratio exposure represents a bank's assets and off-balance-sheet items, irrespective of how risky they are ([link](#))

3.2 Mechanical impact on non-weighted and risk-weighted capital constraints

3.2.1 Impact on leverage ratio

Onboarding new deposits in the form of stablecoin deposits has a negative effect on a bank's leverage ratio, a metric that compares the proportion of a bank's Tier 1 capital to its total exposures.

When a bank accepts deposits from a stablecoin issuer, its total exposure increases due to the added reserves, thus enlarging its balance sheet (denominator of the ratio). This expansion occurs even though the Tier 1 capital (numerator of the ratio) remains constant, leading to a dilution of the leverage ratio.

Suppose a bank has €100 million in Tier 1 capital and €1 billion in total exposures. This would result in a leverage ratio of 10%:

$$\text{Leverage ratio} = \text{Tier 1 capital} / \text{total exposures} = \text{€100 million} / \text{€1 billion} = 10\%$$

If the bank were to add €100 million in stablecoin issuer deposits to its balance sheet, this would increase the asset side and the total exposures would increase to €1.1 billion. Hence, the bank's exposures increase while its Tier 1 capital remains constant, leading to a decreased leverage ratio:

$$\text{Leverage ratio} = \text{Tier 1 capital} / \text{total exposures} = \text{€100 million} / \text{€1.1 billion} = 9.09\%$$

3.2.2 Impact on risk-weighted ratios

However, accepting stablecoin deposits should have no material effect on a bank's risk-weighted ratios, a metric that compares the proportion of a bank's Tier 1 capital to its risk-weighted exposures.

When a stablecoin issuer deposits funds with a bank, the bank's balance sheet expands due to the increase of assets. However, these new assets do not lead to a corresponding increase in the bank's RWAs if they are kept as HQLAs, which include central bank reserves and other assets generating low to no RWAs. As has been described in the previous section, under the LCR these deposits would need to be backed with HQLAs⁴¹.

Suppose the same bank has €100 million in Tier 1 capital and €1 billion in total exposures, and assume that this total exposure generates €500 million in RWAs. Under this scenario, the Tier 1 capital ratio, which is Tier 1 capital divided by RWAs, would be 20%:

$$\text{Tier 1 capital ratio} = \text{Tier 1 capital} / \text{RWAs} = \text{€100 million} / \text{€500 million} = 20\%$$

⁴¹ Under the assumption that the bank's tries to maintain a similar liquidity risk appetite.

Let us now say the bank receives an additional €100 million in deposits from stablecoin issuers. If we assume that this inflow of cash is held as central bank reserves or invested in level 1 HQLAs⁴², it generates negligible additional RWAs. So the total RWAs remain relatively unchanged at €500 million. Total assets on the bank's balance sheet increase to €1.1 billion, while on the liability side the amount of deposits increases and the Tier 1 capital remains the same at €100 million:

$$\text{Tier 1 capital ratio} = \text{Tier 1 capital} / \text{RWAs} = \text{€100 million} / \text{€500 million} = 20\%$$

This numerical example demonstrates that the Tier 1 capital ratio remains unchanged even when a bank accepts significant deposits from stablecoin issuers, as long as these deposits are reinvested into low-risk-weighted assets. The assets increase, but the RWAs, the denominator in the Tier 1 capital ratio, stay constant under the assumption that the deposits are held in low-risk-weighted HQLAs. Thus, banks can accept additional deposits without a corresponding increase in their capital requirements under specific assumptions.

3.3 Impact of exempting central bank reserves from the leverage ratio

The BCBS standards state that the leverage exposure captures all sources of banks' leverage including exposures to central banks. However, a jurisdiction may temporarily exempt central bank reserves from the leverage ratio exposure measure in exceptional macroeconomic circumstances.⁴³ This exception should in principle be accompanied by a commensurate increase in the minimum leverage ratio requirement.

Several major jurisdictions⁴⁴ have exempted, either temporarily or permanently, reserves held by banks at the central bank from the leverage ratio calculation in order to allow banks to hold these deposits at the central bank without them affecting their leverage ratio, since deposits placed with central banks exhibit virtually no risk because a central bank cannot default in its own currency⁴⁵.

⁴² For example, sovereigns with 0% risk weight.

⁴³ See BCBS (2020).

⁴⁴ In the United States, custodian banks have been authorised to exclude central bank exposures from their leverage ratio since 2020. This exemption applies to their exposures to most central banks. See the corresponding [Regulatory Capital Rule](#).

In Japan, the Financial Services Agency of Japan granted banks the long-term exclusion of Bank of Japan reserves from the computation of their leverage ratio, compensated by a 3.15% leverage ratio requirement as part of their coronavirus (COVID-19) relief. This exemption is still in place and should last at least until the end of March 2024. The JFSA's stance post-April 2024 is still in the consultation phase, but from April 2024 onward, the baseline leverage ratio requirement should be increased from 3% to 3.15%, and authorities will be able to continue excluding reserves at the BoJ in exceptional macroeconomic circumstances ([link](#)).

In the United Kingdom, banks with more than GBP 50 billion in deposits have been able to exclude all corresponding central bank claims from their leverage ratio since 2017, compensated by a 3.25% leverage ratio requirement. In practice, the United Kingdom implemented the temporary Basel III exemption in its permanent framework. See the corresponding [policy statement](#) from the Bank of England.

⁴⁵ See Bunea, D., Karakitsos, P., Merriman, N. and Studener, W. (2016), "[Profit distribution and loss coverage rules for central banks](#)", *Occasional Paper Series*, No 169, ECB, Frankfurt am Main, April.

This exemption is generally justified in terms of financial stability and monetary policy transmission.⁴⁶ Coste et al. (2021) highlight that custodian banks, due to the nature of their business, experience substantial volatility in their deposits, largely driven by client activities. This can often result in short-term spikes in their balance sheet, which, under the traditional leverage ratio calculation, can detrimentally affect their apparent leverage and potentially trigger undesired deleveraging.

Exempting central bank exposures from the leverage ratio may completely mitigate or exclude the prudential impact on capital. Banks that decide to keep deposits from stablecoin issuers at the central bank in jurisdictions enabling the exemption of central banks' exposure from the leverage ratio do not face the leverage ratio constraint described above. This may create an incentive for stablecoin issuers to contract with banks from said jurisdictions as these banks do not face the same level of capital constraints from onboarding stablecoin issuers as banks from other jurisdictions.

3.4 How these dynamics affect banks' RWA density and potential regulatory arbitrage

3.4.1.1 RWA density explained

As discussed above, banks face two primary types of capital constraints: the risk-weighted capital ratio and the non-risk-weighted capital ratio (leverage ratio). The proportion of RWAs relative to total assets is known as RWA density. It is measured by comparing RWAs with all assets (RWA density = RWA / total assets). A lower RWA density indicates a lower risk in the balance sheet.

Banks optimise RWA density against their capital requirements. Consider a bank with a minimum leverage ratio requirement of 3% and a minimum Tier 1 capital ratio requirement of 8%. This means that the bank's Tier 1 capital must represent at least 3% of its total exposures (for the leverage ratio) and 8% of its RWAs (for the Tier 1 capital ratio).

The point of equilibrium occurs when a bank's RWA density equals the ratio of the minimum leverage ratio requirement to the minimum Tier 1 capital ratio requirement. In our example, this would be $3\% / 8\% = 37.5\%$. If a bank's RWA density is above 37.5%, it is primarily constrained by the Tier 1 capital ratio. If the RWA density is below 37.5%, it is primarily constrained by the leverage ratio.

Therefore, the bank's main capital constraint can shift depending on the risk profile of its assets, leading to different strategic considerations and implications for profitability and risk management.

⁴⁶ ECB (2021), "ECB extends leverage ratio relief for banks until March 2022", press release, Frankfurt am Main, 18 June.

A decrease in this ratio indicates a balance sheet that is less risky overall, as illustrated in the example below.

Before the inflow of stablecoin issuer deposits, using the same example, the bank has €500 million in RWAs and total assets of €1 billion. This results in an RWA density of 50%:

$$\text{RWA density} = \text{RWAs} / \text{total assets} = \text{€500 million} / \text{€1 billion} = 50\%$$

Let us say the bank receives an additional €100 million in deposits from a stablecoin issuer. These are held as central bank reserves or other HQLAs, which generate little to no RWAs. The total assets increase to €1.1 billion, but the RWAs remain at €500 million:

$$\text{RWA density} = \text{RWA} / \text{total Assets} = \text{€500 million} / \text{€1.1 billion} = 45.5\%$$

As this example illustrates, the bank's RWA density decreases from 50% to 45.5% following the influx of stablecoin issuer deposits under the assumption that they are held in central bank reserves or invested in other HQLAs. This implies that the balance sheet is now less risky on average, as a smaller proportion of the bank's total assets is considered risky under regulatory capital rules. Thus, while deposits from stablecoin issuers can weaken the leverage ratio, they can also lead to a more favourable RWA density, reflecting a balance sheet with reduced risk.

3.4.2 Potential for regulatory arbitrage

From a purely prudential perspective⁴⁷, it can be argued that banks with a higher risk profile, or high RWA density⁴⁸, are less constraint in accepting additional deposits compared with their lower-risk counterparts because a bank collecting new deposits necessarily leads to an increase of its' balance sheet⁴⁹ but does not necessarily lead to an increase of its' RWA⁵⁰

For banks exhibiting a high RWA density, constrained primarily by the risk-weighted capital ratio, accepting stablecoin deposits has no impact on their primary capital requirements. These banks can leverage stablecoin deposits to decrease their average risk density, a strategy that may enhance profitability without necessitating an increase in capital. In this case, stablecoin deposits can serve as a valuable tool to optimise their balance sheet composition and improve their risk-return profile.

By contrast, for banks exhibiting a low RWA density, constrained primarily by the non-risk-weighted capital ratio such as the leverage ratio, accepting stablecoin deposits weakens their primary capital constraint. This illustrates a

⁴⁷ And working under the assumption that stablecoin deposits are invested in HQLAs with no increase in RWAs.

⁴⁸ For this paper, higher RWA density is used as a proxy for higher risk profile without considering techniques aimed at reducing regulatory RWAs such as the use of internal models.

⁴⁹ Regardless how they are re-invested.

⁵⁰ As this this depends how they are re-invested.

kind of selective attractiveness of stablecoin deposits based on a bank's risk profile, potentially leading to a landscape where stablecoin issuers find more willing partners in high-risk banks. This arbitrage opportunity give rise to window dressing practices, particularly around reporting dates as described by Coste et al. (2021).

It is important to emphasise that these observations stem from purely theoretical prudential ratio optimisation perspective. Individual banks' strategies will invariably consider a multitude of factors beyond these metrics, including overall risk appetite, business strategy, whether their shares are traded publicly or not, and market conditions. However, in a narrow sense, it can be concluded that accepting stablecoin deposits could counter-intuitively be more advantageous for high-risk banks compared with their lower-risk counterparts.

4 Conclusion

Stablecoins currently account for a minor share of deposits in the banking sector, but understanding their dynamics and regulatory treatment is vital for credit institutions providing banking services to stablecoin issuers or issuing stablecoins themselves to implement the adequate the adequate operating model.

Converting retail deposits into stablecoin issuer deposits weakens a bank's LCR, turning a retail deposit into a wholesale deposit even when these funds are reinvested in HQLAs.

When a credit institution collects deposits from stablecoin issuers, and treats them as unsecured wholesale funding, it always weakens its liquidity coverage ratio (LCR) even if the bank reinvests them in high-quality liquid assets, due to the 100% outflow rate of these deposit.

When a credit institution issues its own stablecoins but cannot identify the stablecoin holders, it also weakens its LCR by treating the liabilities as unsecured wholesale funding with a 100% outflow rate.

However, when a credit institution issues its own stablecoins and can identify the holder type, it can apply the appropriate outflow rate for that category, which will generally be beneficial when holders are retail. This could incentivise banks to issue stablecoins with mechanisms that allow for the continuous identification of holders, to benefit from more advantageous liquidity requirements.

When retail customers of bank A buy a stablecoin issued by a non-bank that keeps reserves at bank B, both banks could see an unexpected decline in their liquidity ratios. Bank A loses stable retail deposits, while bank B gains volatile wholesale deposits.

Since banks are required to reinvest deposits from stablecoin issuers in low-risk assets to meet liquidity targets, **collecting deposits should not materially affect banks' risk-weighted capital ratio.** However, they could weaken their leverage ratio.

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Acknowledgements

The author thanks Ulrich Bindseil, Jürgen Schaaf, Nico Di Gabriele, Anders Ryden, Michael Grill, Alexandra Born, Nadya Wildmann, Markas Puidokas, and Jens Tapkins for their helpful comments and discussions.

The opinions expressed in this paper are those of the author only and do not necessarily reflect those of the ECB..

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PDF ISBN 978-92-899-6421-0, ISSN 1725-6534, doi:10.2866/438165, QB-AQ-24-017-EN-N