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FOREWORD

Rapid advances in blockchain technologies have underpinned a wide array of innovations in digital assets. Novel forms of digital money issued by private firms and decentralised communities are being used at increasing scale. Partly in response, many central banks are considering issuing digital currencies. Indeed, some have already issued them.

In this context, it is natural for regulators and policymakers to ask what criteria should be used to assess the various forms of money that are emerging, and what properties a future monetary system should exhibit. One criterion that has been widely debated is that of the "singleness of money" - that all forms of money within an economy should be valued, and exchanged, at or close to par. The debate has been especially active in relation to stablecoins, which have seen rapid growth in transaction volumes and broadening of use cases in recent times – reflecting significant global demand for these new types of money. A criticism of stablecoins often heard from regulators is the claim that they fall short of ensuring singleness of money. This critique partly underpins their proposed regulatory approach to stablecoins and to other digital money, such as tokenised deposits and CBDC.

Given the ongoing work by central banks, regulators and legislators to develop a prudential framework for stablecoins, it is important that concepts such as singleness of money are clearly defined – in theory and in practice. Policymakers have asserted their own definitions and views, but it is also important to gauge the perspectives of stablecoin issuers, practitioners and users.

Reflecting its desire to promote debate on topics of relevance to central banks, the Qatar Centre for Global Banking and Finance is happy to provide a platform for the authors of this paper to express their views on singleness in the context of stablecoins. The authors are experts in the digital asset space and many have significant career experience within central banks. As such, they bring a broad perspective to these important topics.

The Qatar Centre's hope is that these authors' views can help advance the debate over stablecoins and their regulation, ultimately helping regulators and market participants to converge on an efficient, innovative and safe system for stablecoin usage.

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The Qatar Centre for Global Banking and Finance provides a platform for debate on topics of relevance to central banks. The views expressed in this paper should be regarded as reflecting those of the authors and not those of the Qatar Centre for Global Banking and Finance, Qatar Central Bank or King's Business School.

EXECUTIVE SUMMARY

The Bank for International Settlements (BIS), the Bank of England (BoE) and other regulators around the world have over the past few years expressed concerns that stablecoins may undermine the 'singleness of money'. They define singleness as the principle that all different forms of money must have the same value at all times and be interchangeable at par and without cost.[1] They highlight that stablecoins, which currently circulate outside traditional payment systems and trade on secondary markets as bearer instruments, can experience deviations from their pegged value and vary in purchasing power relative to their peg currency.

Singleness is not, as yet, a formal regulatory objective, and it did not feature explicitly in regulatory publications until recent years. This new regulatory focus reflects growing concerns that, whilst up until this point, singleness has been a byproduct of effective regulation, the adoption of digital bearer assets such as stablecoins could lead to departures from singleness that could in turn introduce inefficiencies in exchange and ultimately undermine financial stability.

Recent debates over singleness - particularly with respect to its application to stablecoins - have tended to be very binary; it is either met or it isn't. This paper takes a more nuanced view and makes the following key points:

- It is important to differentiate between an idealised concept of singleness in theory — as reflected in recent regulatory communication — and singleness in practice — as it exists among traditional forms of money today. Even within current systems, one can point to deviations from singleness. As such, it is better to view singleness as a spectrum, rather than as a binary concept.

- Where singleness is achieved in traditional systems, one can typically point to substantial policy interventions and publicly provided infrastructure or services that maintain it - such as regulatory frameworks, liquidity facilities and payment systems. These frameworks, which have worked well in the past, may not be appropriate or proportionate as a means to ensure singleness where stablecoins are widely used for payments. Stablecoins may require a different set of policy interventions to achieve the necessary degree of singleness - ones that are appropriate to the business models in which stablecoins are used and proportionate to the level of risk that they pose.

[1] See Bank of England (2023) and Bank for International Settlements (2023) statements in the Appendix.

- Pursuing the goal of singleness without regard to other policy priorities may lead to suboptimal trade-offs that ultimately reduce welfare.[2] Given that stablecoins are effectively the only option for on-chain settlement today, and as the stablecoins to which we refer in this paper are fully backed by appropriate reserves, opportunities for increased safety and innovation may not be realised if the system is constrained only to rely on money issued by banks and central banks.

No single form of money will - or should - exclusively dominate the future financial system, and there are already many different forms of money (ranging from cash to e-money) which exist today. Use cases for stablecoins, tokenised deposits and central bank digital currency will differ. It is important that a well-regulated market system, shaped by the demands of people and businesses, be allowed to reveal the comparative advantages among various forms of money. They all exhibit different strengths and weaknesses, and to elevate one policy goal - singleness - above all others will inevitably, and undesirably, bias that process.

This paper is focused on the United Kingdom, but is intended to be relevant to any jurisdiction in which stablecoins are used. It is not intended as a set of detailed recommendations on how stablecoins should be regulated in practice. Rather, it is a response to the fundamental concept of singleness of money. Singleness, even as an abstract yet practically important concept, may not inherently demand specific regulatory measures, but instead a balanced and nuanced approach, particularly in the context of the evolving digital landscape.

The paper first discusses how different forms of money have evolved over time, then explores how singleness is defined, its history, and the distinction between singleness in theory and in practice. It then considers the implications that the interplay of stablecoins and traditional forms of money may have on singleness, including the nature of stablecoins, the implications for their integration into the financial services ecosystem, and the mechanisms by which singleness in practice is currently achieved today. The paper concludes by arguing that appropriate and proportionate regulation of stablecoins can preserve singleness much as it does in today's monetary system - while pursuing an extreme goal of singleness for its own sake risks undermining innovation and, ultimately, the competitiveness of our financial systems and economies.

[2] The authors would note here that singleness is neither a necessary, nor sufficient, condition for financial stability. This is further discussed throughout the paper.

1. INTRODUCTION

The modern world is underpinned by numerous forms of money. Around the world, cash is used in shops, payments are made and received as bank deposits to and from various accounts, and e-money is sent through apps. Behind the scenes, banks and other financial institutions settle these transactions in central bank money in the form of reserves.

With the emergence of frontier technologies such as blockchain and smart contracts, many new forms of money are being created or may soon be created. They include cryptocurrencies, tokenised deposits, central bank digital currencies (CBDCs) and - our focus - stablecoins. It has become clear in recent years that these emerging forms of money will be, if not already, widely accessible and used at scale in a range of contexts and use cases.[3]

In the future, it is likely that these new forms of digital money will co-exist and interoperate across the current financial services ecosystem, each taking on a specific role and addressing different niches in the ecosystem. Today, both businesses and consumers can choose which form of money and payment service best suits their needs. However, regulators also have an obligation to preserve financial stability and market integrity. Singleness of money has emerged as a key motivation for regulatory intervention in pursuit of these objectives, as well as a criterion by which the stability of privately-issued money is judged.[4] In particular, stablecoins have been depicted as posing particular challenges to maintaining singleness of money.

KEY CONCEPTS

Stablecoins - Throughout this paper the term 'stablecoin' refers to a token designed to maintain stable value ('par value') with regard to an underlying fiat currency, backed at least one-for-one by a mix of cash and cash-equivalent reserves and/or other high-quality liquid assets (HQLA) denominated in that currency.[5] Stablecoins may be used for payment and settlement purposes across a wide range of use cases spanning both traditional and digital finance.

Singleness - Singleness is generally perceived to hold within a given monetary system if equal amounts of any two forms of money have the same value at all times and in all contexts. According to some regulators, a further requirement for singleness is costless

[3] Brunnermeier and Landau 2022
[4] Zellweger-Gutknecht et al (2021), BIS (2023) and Bank of England (2024),
[5] A broader definition would encompass, for example, overcollateralised crypto-backed tokens, such as USDS (formerly DAI) that also seek to maintain a peg to a fiat currency. While such coins are widely used and themselves serve an important role in on-chain finance, we exclude them from our discussions.

interchangeability; that is, all forms of money are at all times interchangeable with each other at par, without cost or friction.[6]

When considering how we use money today, it is clear that a high perceived degree of singleness is attained. When a bank account holder withdraws cash from an ATM, what happens behind the scenes is actually a conversion of privately-issued, commercial bank money (held in the account holder's bank account), to publicly-issued money in the form of cash (held in a physical wallet, or a pocket!). Account Holder A might have a bank account at HSBC, and Account Holder B a bank account at Barclays. If Account Holder A transfers funds to Account Holder B, then neither party thinks about what happens behind the scenes - the conversion of one form of private commercial bank money to another. Both see money being transferred from one account to another, having the same value and being essentially denominated in the same currency and having the same value at both ends of the transaction. This is what singleness looks like, in terms of today's money. It is important to note that fees may be applied by the banks, ATM operators or other payment intermediaries in these examples (withdrawal to cash, and account-to-account transfers). Nevertheless, these are not seen today as violations of singleness.

In an evolving financial services landscape, innovations such as stablecoins may be incompatible with a narrow interpretation of singleness in its most idealised form.[7] However, they can be compatible with a more practical concept of singleness - a property that holds approximately, and where (small) deviations from it should be set against other benefits offered by innovative digital money as is the reality seen in financial markets today. All else being equal, 'more singleness' is better, but all is not always equal and trade-offs must be confronted.

Once we abandon the idealised 'all or nothing' approach to singleness, it also becomes easier to ascertain what underpins the high degree of singleness that we observe today. Singleness today is an emergent property, arising from the interplay of regulation, payment system design, central bank money, and other public infrastructure.[8] Such mechanisms - perhaps adapted - will also be important in preserving singleness in the context of stablecoins.

[6] See the Appendix.
[7] While singleness is now considered unremarkable in many advanced economies - if it is consciously considered at all - we are all familiar with its absence in the international context. We live in a world of fluctuating exchange rates - between the pound and dollar, the dollar and the yen, and so on (see Doepke and Schneider (2017)).
[8] See more on the mechanisms underpinning singleness in Section 3.

2. A BRIEF HISTORY OF SINGLENESS

While singleness has only recently begun to be debated as a regulatory requirement, the underlying concept has a much longer history.9 Understanding this history offers a valuable perspective when assessing the need for and nature of policy interventions today.

'Singleness' is now so commonplace that it is second nature for consumers and businesses to use multiple forms of money when transacting with different bank accounts, e-money or cash. Yet fragmented monetary systems that hindered trade and economic efficiency are historically far more common.

In medieval Europe, various coins issued by monarchs, cities, and private entities circulated simultaneously, differing in metal content, weight, and purity. Merchants had to assess each coin's value individually, increasing transaction costs, creating uncertainty, and impeding commerce (Sussman (2021)).

Similarly, during the U.S. 'Free Banking Era' (1836–1863), banks were not subject to federal regulation, and state-chartered banks each issued their own banknotes. Over 8,000 distinct banknotes circulated, each reflecting the promise of the issuing bank to pay the bearer on demand. However, the value of these notes varied based on numerous criteria including the perceived solvency of the issuing bank and the geographic distance between the note and its issuing bank/point of redemption. For example, a note issued by a bank in Tennessee might circulate at a 20% discount in Philadelphia (Gorton and Zhang (2023)). The result was a fractured monetary system in which the same nominal value could represent different real values. In addition to increased transactional complexities, the lack of a common standard also undermined public confidence in paper money and exposed the financial system to vulnerabilities, including bank runs that rendered some banknotes entirely worthless.

Recognising these issues, economists and policymakers advocated a reformed banking and monetary system to reduce transaction costs, increase trust in financial systems, and stabilise economic activity. The movement towards frameworks that now underpin singleness of money was driven by the need to minimise costs and frictions in the economy and to promote financial stability.

The National Banking Act of 1863 introduced federal oversight to the U.S. banking system, establishing nationally chartered banks and requiring these institutions to back their banknotes with federal bonds. The U.S. adoption of the gold standard in 1900 also helped

[9] See Carstens (2023) The future monetary system: from vision to reality

to solidify public confidence in paper currency by ensuring its convertibility into gold, showcasing how redemption guarantees can help to increase trust in monetary systems.[10]

In the United Kingdom, the concept of the singleness of money has its roots in the foundational reforms of the monetary system during the 19th century. Prior to this, the United Kingdom faced a fragmented monetary environment, with a variety of private banks issuing their own banknotes, often with inconsistent value and limited acceptability outside specific regions. The Bank Charter Act of 1844 marked a pivotal moment in addressing this fragmentation. The Act restricted the issuance of banknotes to the Bank of England, establishing control of note issuance and ensuring that all banknotes in circulation were uniformly backed by the Bank's gold reserves.[11] This reform effectively created a single, trusted money.

The principle of singleness in the context of an economy with *multiple* forms of money evolved during the 20th century with the rise of commercial bank deposits as a dominant form of money. Central banks played a crucial role in ensuring that these deposits were interchangeable with each other and with physical cash at par. This was achieved through prudential regulation and careful system design, including reserve requirements and lender-of-last-resort functions, supported by interbank settlement systems, which maintained confidence in the banking system.

[10] For insightful discussions on related points see Sargent (2011) and references therein.
[11] The Act allowed certain banks that were already issuing notes at the time to continue doing so, provided they did not exceed their pre-existing issuance levels. This included banks in Scotland and Northern Ireland, which were not directly affected by the Act in terms of their ability to issue banknotes.

3. SINGLENESS TODAY: THEORY VS PRACTICE

Regulators sometimes depict an idealised system where all forms of money are always interchangeable at par, without cost, delay, or risk. In practice, however, the various forms of 'traditional' money that coexist today do not quite conform to this ideal. They occasionally exhibit deviations in value, are subject to conversion and acceptance costs, and exhibit liquidity constraints.

These deviations are illustrated in situations where different forms of a given currency do not have equal value (i.e. equivalent buying power), and two transactions that are identical in all respects other than the method of payment may not be (implicitly or explicitly) identically priced. Cash and electronic payments often involve different costs for merchants due to fees, processing times, or handling expenses, which can lead to pricing differences between payment methods. In some transactions, the buying power of cash falls to zero because only electronic payments are accepted, as is increasingly common in shops and restaurants.

Similarly, the value of cash, when compared to other forms of money, is severely reduced for large payments, such as monthly salaries. Conversely, cash may have greater purchasing power where it is preferred to other forms of money. Taxi payments are a common example, where using cash avoids processing fees and the costs of setting up electronic payment infrastructure. Even then, the transactional value of a high denomination banknote, such as a £50 note in the UK or a €500 note in the EU, is far lower than the equivalent amount in lower denomination notes, because so few merchants are willing to accept it.

Different forms of money also cannot always be converted from one to another without cost. For example, withdrawing cash from a deposit account requires finding and travelling to an ATM and sometimes paying fees. Daily withdrawal limits may also apply. Depositing cash is even more difficult as it requires travelling to an open branch of the depositor's own bank where the service is offered. It is also often subject to fees. These access-to-cash frictions are common in today's financial system and disproportionately penalise certain groups, including small business owners, vulnerable members of the public and those on low incomes. In some parts of the world, it is precisely these groups that are making use of stablecoins because of the considerable improvement in access.

Despite these practical frictions, the existing monetary system does, broadly speaking, deliver a high degree of singleness, especially if we regard predictable transaction costs as in some

sense 'minor' deviations.[12] Undoubtedly, there is a pervasive *perception* of singleness in most advanced economies, which is a great success and underpins a self-fulfilling 'no questions asked' approach to different forms of money (Gorton and Zhang (2023)). If stablecoins reach the point where their deviations from singleness are small and pose minimal risk – and we argue that they can – it is entirely reasonable to expect them to benefit from similar perceptions of singleness.

It is important to highlight that singleness, even using the stylised definition employed by regulators, does not mean that all types of money need to be functionally the same. After all, bank deposits, cash and e-money have quite different functionality. Nor does singleness require that all forms of money – even if used fungibly and exchanged at par – have the same risk profile. Clearly, cash and bank deposits exhibit different risks. Commercial bank money is subject to credit risk, which depends on the issuing bank, and cash is more prone to loss or theft.

To the extent it exists today, the stability and singleness of money is upheld across both public and private money through various mechanisms. We now discuss these in turn.

THE ROLE OF PRUDENTIAL REGULATION

Prudential requirements on banks and e-money issuers, such as capital and liquidity requirements, are imposed by central banks and regulators. These seek to reduce the likelihood that the issuers are unable to meet their liabilities on demand and at their full par value. This reduces the risk of runs and increases confidence in the value of privately issued money (Gorton et al (2023)). However, since banks are fractionally backed, (i.e. they do not generally have sufficient liquid assets to cover all of their deposit liabilities), there is always a non-zero probability that deposit claims on banks will lose their par value and/or can no longer be used in transactions.

THE ROLE OF LEGAL PROTECTIONS

Legal protections, such as resolution regimes, deposit insurance (up to a limit), and the preferred status of deposits in bankruptcy, enhance depositor security. These regulatory guardrails act alongside prudential regulation to encourage users of money to treat cash, bank deposits and e-money as equal, rather than question whether a particular bank's IOU is creditworthy and therefore more or less valuable than another's.

However, even with these legal protections, it does not follow that commercial bank money is entirely 'safe', or that balances above insurance thresholds are fully protected from bank failures. Even these safeguards cannot guarantee the par value of commercial bank money

[12] In Bank of Canada (2024), a distinction is made between small and predictable deviations from par arising from such costs, from larger and unpredictable deviations that are arguably more severe violations of singleness.

under all conditions, given that banks engaging in maturity and liquidity transformation inherently carry some degree of risk.[13]

THE ROLE OF CENTRAL BANK RESERVES

The use of central bank reserve accounts in interbank settlement is key in promoting uniform value across all forms of money that operate on - or are layered on top of - payment systems. Institutions using these systems, such as FPS and CHAPS in the UK, settle the transfers of liabilities between each other via transfers of central bank reserves (see BIS (2003)). This minimises settlement risk, in line with the Principles of Financial Market Infrastructure (PFMIs) promulgated by the international body CPMI-IOSCO.

Assuming these systems are in place, banks that have net exposures to each other (arising from aggregated transactions made by their respective depositors) can settle the payments that extinguish these exposures. Simplifying somewhat: if 100 units of deposits at Bank A are used by a depositor at that bank, to pay a depositor at Bank B, each bank credits or debits the depositors' accounts, and 100 units of central Bank reserves (which by definition is valued at 100 units of national currency) will be paid from Bank A to Bank B. This ensures that the transaction settles without any bank out of pocket and enables depositors, participants in the payment system, and the payment system itself to treat each bank's deposits as having equal value.[14] Assuming settlement between banks is assured, within the boundaries of interbank settlement there is thus a mechanical connection between bank liabilities and reserves, allowing 100 units of each bank's deposits to maintain the value of 100 units of national currency (implicitly maintaining the 1:1 peg). Singleness of money is achieved; note however the implicit role of liquidity lines and prudential policy to ensure the banks have sufficient resources to settle transactions - points to which we will return.

THE ROLE OF PAYMENT SYSTEM INFRASTRUCTURES

Layered on top of the reserve accounts system for ultimate settlement are many other payment rails. These rails typically require controls on who can join, based on substantial regulatory requirements, reflecting the complexity of members' business models and riskiness of their balance sheet. This gatekeeping however is very much in the background and allows payment systems to deliver a high degree of singleness between the participants' money, in a way that is hardwired into transactions.

[13] Banks and e-money issuers do still fail, as seen in the recent case of Silicon Valley Bank in the US, where state-backed entities ultimately preserved the value of deposits when other protections proved inadequate. As the Bank of England Governor noted, "the US authorities decided [in the case of Silicon Valley Bank] that confidence in the singleness of money had to be preserved, and so they used something called the Systemic Risk Exemption for a number of banks to extend depositor protection which, in reality, means taking steps to ensure all of the funds lodged in those failed banks remained money." (Bailey (2023)).

[14] As the Governor of the Bank of England put it, settlement in central bank reserves "ensures the singleness of money, that people can be confident that money is fungible at equal value – that the money they hold in their account is as good as any other" (Bailey (2024)).

Payment systems typically treat each private money equally by design, without allowing participants to distinguish according to the issuers involved or the form of money (bank deposits vs e-money, say). Counterparties of course are not obliged to transact with each other or to participate in systems. But if they do transact in these systems, it is only possible to transact at par, regardless of what underlying private forms of money are being used at the various steps towards settlement.

Without the payment system, the various institutions along a payment chain would need to put in place costly bilateral arrangements for settlement at each step. Each bank or e-money issuer that receives a payment takes on new liabilities to its customers as it credits their accounts (given that deposits and e-money are IOUs to customers). The receiving issuer therefore needs to ensure they always receive corresponding settlement assets from the paying issuer. If banks and e-money issuers had no credit risk, it is plausible that all settlements would be reliable. However, assuming each party represents some credit risk, the receiving party could conceivably request some form of collateral or premium to compensate for the settlement risk of accepting a payment. Without the payment system there is greater risk that the paying counterparty will not subsequently transfer assets that make the receiving party whole. The cost of collateral, or the premia added to settlement, would be passed on to users, making some forms of money less valuable than others - a violation of singleness.

It is not only careful rules for participation in these systems that underpin the willingness of parties to transact at par. Payment systems may also make use of pre-funding schemes and legal safeguards. For example, while the UK's FPS is frequently characterised as a pioneering 'instant' settlement system, it actually is underpinned by deferred net settlement combined with a settlement finality regulation and prefunding of payment service providers' accounts.

THE ROLE OF LENDING FACILITIES

A reserve-based Real-Time Gross Settlement (RTGS) system is a type of payment system in which the settlement of interbank payments occurs individually and in real time (as opposed to being netted and batched), and using central bank reserves as the means of settlement. Reserve-based RTGS systems are held up as the 'gold standard' for ensuring singleness, since all participants are effectively using a single form of money. Note, however, there is one subtlety to this argument. That subtlety is that reserve system participants may need to resort to liquidity lines (intraday credit and discount windows) from central banks to be able to settle.[15] Under these facilities, central banks are typically willing to lend against collateral - though perhaps at a punitive rate that deters usage and implicitly incentivises careful liquidity management.

[15] See Norman et al (2011) and Bank of England (2021) for discussions of the history and practice of interbank settlement.

Without this infrastructure it is possible that a bank might mismanage its liquidity and be unable to settle with other banks, or that the performance of the payments system might degrade unacceptably. As a knock-on effect, concerns about differential risks across banks could conceivably induce violations of singleness among commercial bank money, i.e. deposits used by households and firms.[16] Central banks have thus taken on the responsibility of ensuring smooth functioning of interbank markets. This involves lending against good (perhaps pre-positioned) collateral, even if the broader asset holdings of banks feature various risky assets, inappropriate as collateral.

Of course, given the sensitivity of accessing central bank money, it is typically only through a rigorous process that institutions may be admitted to these facilities. Not all payment system participants have access to them. Nevertheless, in recent years many central banks have set up facilities available to a broader set of counterparties than had been permitted historically. Furthermore, many of these facilities were set up at short notice, sometimes in response to crisis events. They also have widened the scope of acceptable collateral.

THE ROLE OF CASH

Deposit and e-money holders can withdraw their funds to cash, converting balances of private money to public money, on demand and at par. This convertibility with public money has traditionally reinforced confidence that a bank or e-money deposit, which is simply an IOU, is actually worth the promised amount of fiat currency.

However, there are good reasons to question the importance of convertibility to cash in preserving singleness in the future. The use of cash has rapidly declined in recent years in many countries and access to bank branches and ATMs has deteriorated dramatically. Furthermore, the costs and practical requirements of withdrawing significant amounts of cash may prevent it from being a significant factor in people's trust in money. Even in times of financial stress, these limitations may mean that cash convertibility is less relevant to preserving singleness than the aforementioned role of reserve-based settlement with prudential oversight and, possibly, liquidity facilities.

[16] Of course, in the absence of such facilities banks might adjust and be more conservative in their behaviour - but this simply reallocates where the costs of this liquidity risk manifest themselves.

4. STABLE OR SHAKY?

Stablecoins exhibit a number of characteristics that distinguish them from traditional forms of money.

- *On-chain issuance* - Stablecoins are issued 'on-chain' (on a blockchain). Indeed the same stablecoin may be issued on multiple chains.[17] Stablecoin issuers may be companies with varying degrees of centralised authority, or their operation may alternatively be defined by a set of smart contracts designed or governed by decentralised communities (perhaps organised as DAOs). However, in addition to our decision to focus this paper on only HQLA or cash/cash-like backed stablecoins, we will focus below on stablecoins where the issuer is a single company or tightly controlled consortium of identifiable parties.

- *Bearer instruments* - Stablecoins exist as bearer instruments. Ownership of the instrument is identified with *possession.* The legal rights associated with the instrument, such as redemption rights, accrue to the bearer rather than being personal to a specified customer.[18] Possession in this context amounts to controlling a private key for an address associated with a balance of stablecoins, which in turn grants authority to use the stablecoin in some way (based on the smart contracts defining the token, and any off-chain legal obligations, terms and conditions). An obvious use of a stablecoin is to make a payment - to send value to another address. Such payments are self-settling: the token itself carries the rights, and liability remains with the stablecoin issuer regardless of who holds it. There's no need for complex settlement systems in which the paying issuer transfers settlement assets to the receiving issuer because liabilities do not move between issuers as they do when users make payments between two banks. As a result, payments do not need to involve the issuer. A well-known illustration is the Bank of England, which issues cash and promises to pay the bearer on demand but is not involved in individual cash transactions in any way.

- *Peer-to-peer transactions* - In contrast with the traditional frameworks we have described in previous sections, transactions in stablecoins are not executed via

[17] We use the term 'on-chain', meaning that a transaction has been recorded on a blockchain by establishing a register of ownership (a mapping between addresses and balances in the simplest case of a fungible token, of which a stablecoin is typically an example) and defining standard operations on the register which implement changes in ownership. It is beyond the scope of this paper to provide a detailed description of blockchain primitives but we refer the interested reader to Drescher (2017) for general blockchain primitives and Antonopoulos and Wood (2019) for basic discussions of smart contracts.

[18] An example of rights being personal to a specified customer is a depositor's rights under current account agreement with a bank.

centralised payment systems. Stablecoins are transferred between holders via transactions (which could be initiated by a stablecoin holder or service provider, or triggered by a smart contract) and can also be transferred across multiple chains through a variety of cross-chain protocols. Most prominent stablecoins are deployed on permissionless networks, where accounts or wallets can be set up by anyone.

- *Settlement* - The nature of stablecoins as bearer assets means that there are no auxiliary reconciliations in connected reserve-account systems as in the case of transactions using commercial bank money.[19] Settlement is identified with the transaction once the transaction is added to a block. There is no change to the issuer of the money as there is in payments between banks. There are also no changes in the amount or location of backing assets. From a singleness perspective, this leaves users free to exchange stablecoins at values they determine between themselves and their counterparties. There is no payment system through which multiple forms of money, such as deposits, e-money and other stablecoins, are brought together and treated as equal.

- *Secondary market value* - It is of vital importance to note the difference between the value at which a stablecoin is exchanged in secondary markets and the value of the assets for which it can be redeemed. For simplicity, we will imagine that redemption is for fiat, though precisely what assets a holder of a stablecoin will receive on redemption may vary from protocol to protocol (they could be bank deposits or even in some cases the underlying backing assets, such as HQLA securities). The point is that they can be redeemed precisely at par. In fact, even during episodes where certain stablecoins have *traded away from par* in secondary markets, *redemption at par* has continued.[20] As discussed further below, providing redemption is of existential importance to stablecoin issuers. It facilitates mechanisms by which the stablecoin's price remains stable on secondary markets. Issuers are therefore crucially incentivised to ensure redemption is sufficiently reliable and widely available.

As set out in the executive summary, in recent years an increasing number of regulators have voiced concerns relating to the potential impacts of stablecoins on the singleness of money. Regulators' fears of deviations from singleness seem, firstly, to derive from potential impacts on the efficiency of payments, settlements and trade, and secondly, from risks to financial stability.

[19] Note that this is still the case even if the backing asset for a stablecoin is central bank reserves. They may still be bearer instruments. In this thought experiment, the stablecoin issuer would have a deposit with a central bank and nothing at all would change in this account if a holder of the stablecoin were to send a payment to another party.
[20] For example, following the collapse of Terra's UST in May 2022, USDT briefly de-pegged, trading below $0.95 on some exchanges. Despite this market instability, Tether processed over $10 billion in redemptions—more than 10% of its circulating supply—within 48 hours, maintaining its 1:1 redemption ratio with the U.S. dollar.

From the efficiency perspective, the concern most frequently raised is that the financial ecosystem risks fragmentation, where some forms of money are perceived as more reliable or valuable than others, and where resources must be spent assessing quality and in keeping track of domestic exchange rate variation.[21] From the financial stability perspective, several interrelated concerns have been raised. These include the absence of a regulatory framework for issuers and standards for auditing, custody and smart contract reliability - issues that seem likely to be resolved in the longer term as regulatory frameworks are introduced and stablecoins become more widely used.

A common mantra among regulators is *"same risk, same regulation"* but a corollary of that is - or should be - *"less risk, proportionately less stringent regulation."* Nevertheless, risks should of course be at the forefront of any regulator's mind. In order for these risks to be appropriately mitigated it is important to assess the true risks that stablecoins pose.

If a stablecoin were to de-peg significantly – perhaps as a result of a loss of confidence in backing assets, convertibility, or a reliable source of liquidity for the issuer to draw upon – then it is plausible that mass redemptions could amplify the initial deviation from par as trust in the stablecoin diminishes. This could overwhelm convertibility mechanisms and the capacity of arbitrage traders to drive the stablecoin back to par. In this context, issuers may be obliged to sell backing assets to make good on their promise of redemption at par. This in turn, if performed at scale and by multiple stablecoin issuers as part of a contagion, could reduce the value of the backing assets in the market, eroding issuer capital, and in turn worsening concerns and possibly spilling over to other stablecoins.[22]

The above essentially describes a standard bank run, and some of the broader impacts that might arise from it. The stablecoins we envisage in our analysis are akin to narrow banks, fully backed by HQLA in the form of cash and cash-like assets including short-term highly-rated government debt (e.g. gilts and US Treasuries). Stablecoin issuers do not engage in fractional reserve banking or, hence, credit creation, as banks do. Taken together, these factors should substantially reduce the risk of a run-like outcome. Nevertheless, unless the backing assets are of very short maturity and rapidly available to liquidate at reasonable prices, there is a risk that rapid redemption at scale could lead to disruptive runs that could turn a liquidity problem into one of solvency.[23]

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[21] Concerns have also been expressed that novel moneys may emerge in the context of closed loop systems or 'walled gardens' where the moneys may be tied to platforms for trade (in goods, services, assets...) opening up the possibility of anti-competitive behaviour and the suppression of innovation and choice (Cunliffe (2023)). These hypothetical concerns go beyond simply the intrinsic properties of stablecoins and involve a more complex interaction of parties and phenomena that are beyond the scope of our focused analysis of singleness.

[22] A tendency of stablecoins to de-peg significantly could also disrupt other protocols and applications in which the stablecoin is used as collateral. This could in turn lead to unpredictable spillovers and the introduction of contagion risk into wider market contexts.

[23] Interestingly, there may be a tension between central banks' desire in normal times to oblige issuers to offer very fluid and rapid redemption, and what might be optimal in times of distress.

This potential for a stablecoin issuer to become insolvent - or even only fears over insolvency - may be exacerbated by the current immaturity of some stablecoin business models, limitations in market infrastructure, and the lack of harmonised global regulation to consistently apply requirements across the stablecoin market. Recent events, such as the temporary destabilisation of USDC during the Silicon Valley Bank crisis, illustrate how fragility in one part of the system can reverberate (though in this case the origin was within the traditional and heavily regulated banking industry), leading to significant de-pegs and liquidity crunches.[24] Other disruptions, such as the LDI crisis and the Dash for Cash, also emphasise the fragility of some markets, even those traditionally thought of as highly liquid, such as segments of the US Treasuries market.[25]

Regulators are right to be concerned about these worst-case scenarios: gaming them out helps them identify what policies and market structure are required to avoid them. Such analyses can also identify trade-offs that are yet to be fully understood. Digging into what might cause, or prevent, deviations from singleness is revealing of core questions about the regulation of fully reserve backed stablecoin issuers and how this should differ from the treatment of fractionally reserve backed banks.

[24] See Michael Barr's uncomfortable review of the activities of regulators leading up to SVB's collapse.
[25] See Pinter et al (2024) and Cunliffe (2022)

5. WHAT WILL UNDERPIN SINGLENESS FOR STABLECOINS?

As noted by Garratt and Shin (2023), deviations from singleness are undesirable, all else being equal, given the inefficiencies that may stem from it. As noted, stablecoins currently circulate on largely unregulated, decentralised, and global blockchain platforms as bearer instruments exchanged in peer-to-peer transactions. Deviations from par are observed. In extreme cases they have been large (even if temporary), and in several cases of failed stablecoins they have been permanent.

It is reasonable to expect stablecoins to exhibit smaller and less frequent deviations from par value in the future, even if such deviations are not completely eliminated. We now discuss various factors that influence the degree to which singleness can be maintained.[26]

THE ROLE OF BACKING ASSETS

Public confidence in the underlying backing assets is key to maintaining singleness for a given stablecoin. Backing assets ensure that a stablecoin can be redeemed at par and therefore that its value remains stable. By holding HQLA - such as cash, short-term government debt, or other low-risk, highly liquid instruments - issuers provide a credible guarantee that every stablecoin in circulation is fully reserve-backed. This not only underpins confidence in the stablecoin's ability to maintain redeemability at its pegged value, but also enables the exploitation of arbitrage opportunities, contributing towards maintaining stability and minimising deviations from par in secondary markets. Transparency around the composition and custody of these reserves is essential, as is regular auditing. In the absence of a robust, verifiable reserve of backing assets, stablecoins risk becoming speculative instruments rather than a reliable form of money.

Following the example of e-money firms, the use of bank deposits for backing is common for a significant percentage of leading stablecoins' reserves. Under the EU's Markets in Cryptoassets Regulation (MiCA), this is formalised by requirements on certain shares of backing assets to be held by stablecoins (more correctly, E-Money Token and Asset-Referenced Token issuers) in credit institutions (that is, commercial banks). Some notable deviations from par however, have derived precisely from dependence on traditional banking rails and, by extension, their regulatory framework. The inability of traditional rails to enable constant convertibility and the riskiness of bank deposits - even at heavily

[26] These observed deviations from par do not mean, as Garratt and Shin seem to suggest, that stablecoins would then imply unacceptable efficiency losses, should be subordinated to tokenised deposits, and should receive minimal regulatory support (or even regulatory opposition).

regulated institutions - poses a risk to singleness, as was seen during the collapse of Silicon Valley Bank and the temporary effect on USDC's value on secondary markets.

These challenging experiences for stablecoin issuers have led to useful lessons. By revealing difficulties with some backing models previously favoured by regulators, and by highlighting dangers of concentration in the type and custody of reserves, a path to more reliable backing models can be discerned, with a growing recognition of the role played by HQLA in reserves.

THE ROLE OF CONVERTIBILITY AND REDEMPTION

Stablecoin convertibility and redemption and are two distinct mechanisms that allow stablecoin holders to exchange their tokens for other forms of money. They operate in different ways, serving different functions and therefore should be viewed as playing distinct roles in the stablecoin ecosystem.

- *Convertibility* involves the ability of stablecoin holders to exchange their tokens with other market participants for other forms of money, such as bank deposits, other stablecoins. Today, convertibility is generally facilitated by exchanges or intermediaries. When a stablecoin is converted to another form of money, the stablecoin continues to exist but is held by a new owner.

- *Redemption* involves returning stablecoins to the issuer in exchange for commercial bank money, or e-money (or, in the future, potentially CBDC), after which the stablecoins are 'burned': removed from circulation. In contrast to convertibility, when a stablecoin is redeemed, it ceases to exist outside the issuer, and the original owner holds the equivalent value in another form of money. Redemption results in a reduction in the circulating supply of the stablecoin. While convertibility will likely play a role in stablecoins' everyday functionality, redemption may, in the long term, become a more occasional, exceptional option rather than a core, routine feature of stablecoin use.[27]

- These concepts must be clearly distinguished, since while convertibility plays a role in maintaining the singleness of money, it is not an inherent part of the issuer's role, unlike redemption. Firstly, it is not feasible for a stablecoin issuer to offer convertibility into other stablecoins or other forms of money, as this would require them to be able to supply other forms of money on demand. Secondly, from a

[27] Note that, in practice, some of what is colloquially referred to as redemption is actually conversion from a stablecoin to another form of money. Stablecoin issuers today generally offer redemption via intermediaries or exchange partners. When these intermediaries receive a redemption request, they may pay out the bank deposits but hold onto the stablecoins in order to resell them into the market. From an economic perspective, the stablecoins are not burned or taken out of circulation – hence this is not the same as redemption.

regulatory point of view, convertibility has the disadvantage that it depends on finding a counterparty to take the other side of the transaction, and / or be on-boarded to multiple banks and payment providers that are connected to the domestic payment systems so that the issuer can convert the stablecoin into users' commercial bank accounts or other forms of money. (At an extreme, convertibility requirements that aim at singleness might also require issuers to have arrangements with ATM providers to enable conversion between cash and stablecoins.)

- In a stressed market, or during a crisis of confidence in a given issuer (whether a bank or a stablecoin issuer) it may not be possible to meet convertibility requests to a given form of money.

- Redemption, on the other hand, is clearly within the remit of the stablecoin issuer and is a critical backstop to preserve the value of stablecoins. The issuer receives payment from stablecoin purchasers and draws upon its backing assets to enable repayment at the point of redemption. As illustrated by existing USD stablecoins, redemption is typically offered subject to conditions such as minimum redemption values. Whilst redemption may eventually be an infrequent occurrence as opposed to a regular feature of stablecoin issuer operations, redemption rights create a fiat backstop for users, ensuring confidence in the value of a stablecoin, and providing the par access to fiat that enables arbitrage.

To ensure that stablecoins maintain their par value, it is necessary for a significant proportion of users to have the right to redeem at par, within a reasonable timescale. Redemption at par is generally a feature of regulatory regimes around the world. This supports singleness, both by ensuring stablecoins keep their value on secondary markets and by ensuring users can move between stablecoins and bank deposits without significant loss of value. To further reinforce the ability to convert between stablecoins and bank deposits at par, regulatory requirements may also be required to ensure that redemptions fees and other restrictions are not excessive. Such restrictions can take the form of minimum redemption amounts or delays in payout. These frictions often drive deviations from par in secondary markets, as they interfere with arbitrage mechanisms.

Finally, requirements may also be needed around the involvement of third parties in the redemption process. Today, major stablecoin issuers often do not perform redemption themselves but rather operate through intermediaries such as market makers. The involvement of an intermediary can enhance efficiency and reliability but also introduce friction in the redemption process if not appropriately managed. In extreme circumstances, the failure of a redemption partner could fundamentally break the redemption process.

THE ROLE OF ARBITRAGE

One manifestation of the ability to exchange stablecoins as bearer instruments, independent of payment systems, is that stablecoins are often traded in secondary cryptoasset markets. The movements of supply and demand on these markets may lead to potential deviations from par value - seen by some regulators as unacceptable departures from the singleness of money.[28]

However, if we take the starting position that a stablecoin is a form of money, regulated and designed to ensure stability, as opposed to an investment or speculative asset, then there are typically three scenarios in which stablecoins would be exchanged in the course of a transaction on a secondary market:

- *As digital settlement assets* - stablecoins may be used to settle a transaction on an exchange, be it in a security (tokenised or otherwise), derivatives contract or cryptocurrency. Rather than being 'traded', the stablecoin is used as a settlement asset similar to the typical settlement in commercial bank money on securities markets. In this case it is possible that stablecoin settlement would be more efficient and reliable - carrying a lower inherent settlement risk. Traders may therefore price the instrument being traded at a discount when compared to a transaction that would settle in commercial bank money. It would be no surprise to see different trading prices for the same asset depending on the costs and relative efficiencies associated with different settlement assets, such as commercial bank money, stablecoins, or CBDC.

- *In an on-chain FX transaction* - a stablecoin may be exchanged for a stablecoin referencing another fiat currency, analogous to an FX transaction. In this case its value against the other currency could fluctuate in line with a combination of FX exchange rates, settlement costs and relative efficiencies. Again, there is a possibility of deviations from pricing parity with other forms of money, as a stablecoin pair may trade at a slightly different spread to a traditional spot FX pair due to, for example, the potential for greater settlement efficiencies and thus reduced overall transaction cost and risk.

- *In the course of a conversion from one form of money to another* - GBP-denominated stablecoin (GBP-A) could be exchanged for another form of GBP - such as a GBP-denominated stablecoin having another issuer (GBP-B), or for a GBP CBDC, or be paid out as GBP funds to a bank account. In this case, this involves the conversion of

[28] See, for example, Bank of England (2023), section 1.3, which states "Today, stablecoins are commonly traded in secondary markets. Their prices frequently deviate from par value and in times of stress these deviations can be significant. Were these stablecoins to be widely used for payments in the economy, such deviations would be a departure from the singleness of money".

one form of regulated money into another. Again, the participants to the transaction will determine the conversion price, which will be influenced by supply and demand on the exchange as well as the complexity and cost of undertaking the conversion. The result could be multiple prices for different forms of GBP money, whether bank deposits, stablecoins, or CBDC.

In all of the above cases, arbitrage opportunities can be exploited, causing a reversion towards the par value at which the stablecoin is issued and redeemed. Arbitrage opportunities play a similar role in maintaining equity price parity across different traditional exchanges that exist today. As long as the stablecoin issuer provides access to issuance and redemption at par, then the potential for arbitrage can play a key role in contributing to approximate singleness for stablecoins, even where they can be freely exchanged on secondary markets. As noted previously, there are significant commercial incentives for issuers to ensure that access to issuance and redemption is wide enough to enable the arbitrage that contributes to keeping the stablecoin stable.

In the context of the above, deviations from par may seem surprising. If redemption at par is assured then the ability to buy or sell stablecoins at prices away from par should open up an arbitrage opportunity. The question is why this might not happen perfectly in markets at present. While imperfect arbitrage is not a peculiar property of blockchain environments, it is certainly the case that arbitrage in this context is not as sophisticated as in traditional financial markets. Blockchain fees - both explicit and implicit - are, for many of the most prominent chains, high. On many chains it is costly to execute an arbitrage transaction and, more subtly, factors such as maximal extractable value (MEV) can disincentivise traders from fully exploiting arbitrage opportunities.[29] Moreover, redemption rights today often introduce significant barriers, such as high minimum redemption thresholds (e.g. $100,000) and restrictive onboarding requirements for non-business entities. Even in the European Union, where MiCA mandates more inclusive redemption rights, significant frictions may remain, such as the need to produce notarised identification documents and waiting periods of up to seven business days, further limiting the attractiveness of arbitrage opportunities. Added to this, there is - even now - a relatively small pool of liquidity and breadth of market participants. It is our belief that some of these headwinds will be moderated in the coming years, as usage and liquidity grow, and also partly through innovations in interoperability and cross-chain protocols that moderate or even eliminate cross-chain frictions. Without such frictions, new entrants to the market will increase competition for arbitrage opportunities as they arise, enhancing singleness in secondary markets.

[29] See EY (2023) An introduction to maximal extractable value on Ethereum

THE ROLE OF SMART CONTRACTS

Smart contracts have the potential to be a mechanism that supports singleness as a critical tool for preserving trust and confidence in stablecoins, automating key stablecoin management processes in a transparent manner. They can enable the issuance, transfer, and redemption of stablecoins to happen in a predictable, verifiable, and efficient way on public blockchains. Smart contracts can also embed clear rules on the governance of the stablecoin, including collateralisation and redemption at par. And they may even be employed as a means of achieving interoperability between different forms of digital money with a minimal degree of centralised coordination.[30]

Confidence in the 'sameness' of a stablecoin issued across multiple blockchains comes primarily from the issuer's guarantees, rather than the use of identical smart contracts, as different blockchains require different smart contract languages or may not support smart contracts at all. Notably, 'bridged' stablecoins on unsupported blockchains often trade at par with their natively issued counterparts, reflecting market confidence in the ability to 'unwind' the stablecoin back to the issuer's underlying guarantees. Additionally, the transparency of open-source code demonstrating consistent functionality across chains further helps inspire trust.

Given that contracts are deployed transparently on-chain and are immutable, it is also important to acknowledge that there is currently scope, as with other forms of open source code, for bugs to emerge and be rapidly exploited.[31] However, growing experience in risk mitigation as the ecosystem evolves, augmented by bug bounties and the re-use of heavily tested standard contract templates, can contribute to the responsible implementation of smart contracts, supporting the introduction of trusted, well-regulated and well-governed stablecoins.[32]

THE ROLE OF GOVERNANCE AND SUPPORT SERVICES

As stablecoins develop, so too does an ecosystem of governance and support services. These include conversion services, payment acquirers, ratings agencies, data providers, and auditors. The ecosystem contributes to usability and trust. Trust is an important ingredient in the singleness of money. This can minimise sensitivity of demand to news and, indeed, build a virtuous circle whereby the peg is maintained partly by expectations that it will be maintained. Without secure belief in the presence and reliability of underlying assets, the anchor of assured convertibility at par in redemption is undermined. This opens the door to

[30] See Fireblocks' paper, 'Achieving Uniformity of Tokenized Money Through Smart Contracts'

[31] Not all contract developers make their source code fully public, via verification systems. Furthermore, we note that upgradable smart contracts can help address some of the vulnerabilities arising from immutability, as are functionalities allowing suspension of operation, and limitation of permissions to transact with the contract. Of course, the adoption of such features is an example of the sort of progress towards best practice that we expect to continue.

[32] See OpenZeppelin's products, for examples of how the robustness and efficiency of smart contracts is improving. The Smart Contract Primer sets out eight principles proposing how to apply existing legal and regulatory frameworks to mitigate risks from utilising such technology.

herding and could allow a vicious circle of beliefs in further de-pegging after an initial, relatively minor deviation from par. As governance and the ecosystem of support services improve and deepen, so should trust in stablecoins.

An ecosystem of auxiliary services is beginning to spring up within the blockchain space. Innovation in custody is especially active, and in oracle services that obtain and reliably communicate information about backing assets. Developments in multi-party solutions to secure private keys and professionally-operated wallet services are underpinning a tighter connection between stablecoins and their backing assets.[33] Oracle services complement this infrastructure, via efficient and reliable proofs of reserves and price feeds from multiple blockchains and exchanges. Indeed, oracles connecting multiple blockchains - in addition to conveying information about off-chain reserves - are also likely to enhance price discovery through broadening and connecting pools of liquidity across platforms.

[33] Efficient and secure wallet technology arguably also improves the ability of arbitrageurs to take rapid advantage of emerging mispricing by reducing the trade-off between maintaining a secure cold wallet, versus trading with a hot wallet.

6. A ROLE FOR POLICY

In the earlier sections that describe the traditional system, we noted the important role that regulators and publicly provided infrastructure play in underpinning singleness of money. They should also play important, but different, roles in sustaining singleness with stablecoins.

As discussed throughout this paper, stablecoin business models use backing assets and redemption rights to maintain a stable value in the referenced currency. To the extent they are successful, they achieve a degree of singleness that is broadly consistent with the singleness achieved in practice today. Policies that reinforce the soundness of the issuer and reliability of redemption will promote the stability of the stablecoin's value and thereby promote its singleness: solve for stability and singleness will follow.

Whilst there are many tools to promote consumer protection and financial stability, we set out below a set of policy recommendations to achieve not only these traditional aims of regulatory policy, but which also simultaneously can encourage a high degree of singleness of money.

SOUNDNESS OF THE STABLECOIN ISSUER

Confidence in the soundness of the issuer, specifically its ability to back up its redemption commitments, is a cornerstone of maintaining stablecoins' utility and reliability within the financial system. Regulatory frameworks should address both prudential and operational risks. Given the nascent and evolving nature of the stablecoin industry, regulators and central banks must strike a balance between imposing sufficient safeguards to protect users and the broader financial ecosystem, whilst avoiding unnecessarily narrow constraints that could stifle healthy competition and innovation.

The following policy interventions to support the soundness of the issuer should be sufficient to lead to an appropriate degree of singleness:

- The majority of backing assets should be restricted to highly liquid and safe assets, such as a combination of short-maturity government debt, reverse repos, deposits at commercial banks, or reserves at the central bank.

- Regulators' concerns about the quality of some backing assets could potentially be assuaged by the imposition of haircuts on the value of those backing assets (a technique used for risk management of collateral in repo and securities lending trades) commensurate with the nature of the backing assets and with operational risks.

- Central banks should consider providing some form of reserve account for stablecoin issuers, enabling (but not requiring) them to hold the safest form of HQLA.

SWIFT AND RELIABLE REDEMPTION

As discussed extensively, the ability to redeem stablecoins efficiently and reliably at par is essential to maintaining their value. However, redemption requirements must strike a balance between operational feasibility on one hand and absolute efficiency and reliability on the other. We propose:

- Require issuers to make available redemption at par, whether intermediated or direct from the issuer, within a reasonable timeframe. Redemption will need to be available to a sufficient proportion of the issued stablecoins to ensure the liquidity and accessibility that enables arbitrage. Redemption windows and timeframes should not be unduly lengthy, taking into account potential requirements for KYC and other operational processes.

- Frictions and costs directly associated with redemption, such as redemption fees, could be subject to restrictions. However, consideration should be given to stablecoin business models and cost of operations, as well as possible financial stability benefits of fees and delays designed to limit disruptions in times of liquidity pressure.

- Central banks should consider designing facilities to offer support in a *liquidity* crisis. These are an important aspect of existing infrastructure. Indeed, credit facilities are often offered even outside times of systemic stress. Central banks could, in theory, provide a line to stablecoin issuers under appropriate circumstances, secured against the issuer's backing asset reserves held in the form of HQLA. The precise details for such a scheme are beyond the scope of this paper to discuss but such a facility could underpin rapid and efficient redemption at scale. If the issuer cannot otherwise liquidate reserve assets quickly enough at reasonable prices, they can simply redirect funds received from the central bank. It is conceptually difficult to envisage the central bank being exposed if offering a line, provided that custody of and access to collateral is assured - perhaps through pre-positioning.[34] In fact, in the future the

[34] Of course, there must always be the presumption that issuers should manage their own liquidity to avoid relying on lines and such facilities – but it is important for central banks to consider what precisely is the risk they feel such a line would expose them to, that they are not already exposed to when offering lines to traditional banks. This is a more targeted intervention than standing ready to support prices of, say, government bonds, through direct purchases - and is in line with the traditional Bagehot principles of lending freely to solvent institutions facing liquidity crunches, based on good collateral and penal interest rates. One benefit of the "narrow banking" model of stablecoins is that it is easier to distinguish solvency from liquidity issues, which can be exploited in establishing the sort of facilities that might be inappropriate for fractionally backed commercial banks with complex banking books.

collateral itself may be on chain, given the exploration of government debt tokenization.[35]

- It may be appropriate to permit - though not require - stablecoin issuers and payment service providers to join public payment systems, for example as direct participants in RTGS with settlement accounts. Participation could support redemption by enabling wider conversion into other forms of money at par, through the transfer of backing assets between money issuers such as commercial banks or EMIs. This would be in line with the recent UK regulatory objective to widen access to such systems.[36] Future solutions could include operational infrastructure that enables conversion between different forms of on-chain money at par, possibly supported by on-chain central bank money.

[35] See the HKSAR Government's Digital Green Bonds Offering and UK finance Digital Gilt Roadmap

[36] See the Bank of England's review of access to RTGS settlement accounts

7. CONCLUSION

Stablecoins represent a new frontier in the evolution of money, offering the potential to enhance efficiency, competition, and innovation in financial markets. While concerns about deviations from singleness are understandable, they must be placed in the broader context of today's financial ecosystem, which already accommodates practical deviations from the theoretical ideal of singleness. Bank deposits, e-money, and cash coexist today despite differences in functionality, acceptance, and transaction costs. Well-regulated stablecoins can similarly integrate into the financial system while delivering distinct benefits that complement existing forms of money.

The principle of singleness, as articulated by some regulators and central banks, risks being framed too rigidly, imposing expectations on stablecoins that exceed those applied to established forms of money. Singleness is best understood not as an absolute, but as a spectrum where practical outcomes are shaped by robust regulatory frameworks and market mechanisms, rather than uncompromising theoretical ideals. Over-regulating stablecoins in pursuit of perfect singleness could stifle their ability to foster competition and unlock efficiencies. Solve for stability, and singleness will follow.

Appropriate and proportionate regulation is key – indeed, by regulating for financial stability, singleness can be expected to follow. Stablecoin issuers, after all, are naturally very incentivised to ensure a high degree of singleness, with price stability being of existential importance to any stablecoin. By requiring robust redemption rights, high quality liquid backing assets, and prudent operational oversight, regulators can ensure that stablecoins do not pose significant risks to the financial system and – by extension - enhance singleness. Crucially, regulatory frameworks should recognise the unique characteristics of stablecoins as bearer instruments that operate outside traditional payment systems, rather than forcing them to conform to a model designed for traditional liabilities like bank deposits.

The broader policy debate must also weigh the potential of stablecoins to address inefficiencies in the financial system. Stablecoins can provide an alternative to a highly concentrated and often fragile banking sector. They can reduce costs in domestic and international payments and provide a foundation for greater innovation as decentralised finance paradigms converge with traditional finance. The success of stablecoins lies not in replicating traditional money but in offering new functionalities that enhance the financial ecosystem. Indeed, regulators should account for the potential of stablecoins to complement other new forms of digital money, such as tokenised deposits and CBDCs, plus the ability to support programmable payments and on-chain financial applications, and the potential to support the transition more broadly to a digital financial system and digital economy.

This paper argues for a balanced and forward-looking regulatory approach that preserves financial stability and trust while fostering an environment for innovation. Stablecoins, as part of a diverse monetary landscape, have the potential to drive meaningful improvements in the way money is issued, transferred, and used. Policymakers should embrace this opportunity to develop a financial ecosystem that not only upholds public confidence but also supports growth, competition, and social welfare in the digital age.

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APPENDIX - REGULATORY STATEMENTS ON SINGLENESS

STATEMENTS FROM THE BANK FOR INTERNATIONAL SETTLEMENTS (BIS)

Extract from Stablecoins versus tokenised deposits: implications for the singleness of money:

"A cornerstone of the modern monetary system is the "singleness of money". Singleness ensures that monetary exchange is ***not subject to fluctuating exchange rates*** *between different forms of money, whether they be privately issued money (e.g., deposits) or publicly issued money (e.g., cash). With singleness of money, there is* ***an unambiguous unit of account that underpins all economic transactions in society****. Ruling out exchange rates between different forms of money allows money to serve its role as a coordinating device for economic activity. In this context,* ***"approximate singleness" is an oxymoron. Small departures from par introduce frictions in trade and exchange that are amplified when they reverberate through economic transactions."***

Extract from remarks by Ida Wolden Bache, Governor, Central Bank of Norway, published in BIS paper: Central banks, macro-financial stability and the future of the financial system:

"[A] potential threat to singleness is the new potential forms of money: Crypto currencies that represent their own units of account, and stablecoins which piggyback on existing national units of account. … ***If programmability turns out to be something people really want from their money, and supply is allowed to develop freely, it may threaten the singleness of money****. It may lead to several units of account being used in parallel within a country, or a more fragile parity between different representations of the same unit of account"*

STATEMENTS FROM THE BANK OF ENGLAND

Extracts from the Bank of England Discussion Paper on the approach to innovation in money and payments (emphasis added):

"Under this [singleness] principle, all different forms of money - whether we hold them in bank accounts, notes, or coins etc- must be exchangeable with each other at par value. In other words, the value of a pound in an individual's bank account must equal the pound coin in another individual's pocket.… In other words, the value of a pound in an individual's bank account must equal the pound coin in another individual's pocket. Singleness is crucial to monetary and financial stability for a number of reasons: First, households and businesses can be assured that all money in the economy has ***the same value at all times****. This underpins trust and confidence in money. Second, there is an unambiguous unit of account that underpins* ***all economic transactions in society****." (Section 1.1)*

"The 'singleness' of money refers to the principle that all forms of money should have ***the same value****, be generally accepted as a means of payment and* ***be interchangeable without loss of value*** *with* ***all other forms of money*** *used in the economy. The stability of the UK economy and monetary system relies on this principle.*

In the case of stablecoins, singleness of money could be ***compromised by frictions (e.g. delays, costs) in the ability to exchange the stablecoins for other forms of money****, disruption to the ability to make payments, or a lack of confidence in the issuer's ability to fulfil requests for redemption in full. …*

This does not mean that issuers of stablecoins have to be regulated in exactly the same way as commercial banks. But it does mean they ***must be regulated in a way that ensures that stablecoins would maintain the same value as, and would always be fully interchangeable with, other forms of money****. This speaks to the singleness of money. …*

Today, stablecoins are commonly traded in secondary markets. Their prices frequently deviate from par value and in times of stress these deviations can be significant. Were these stablecoins to be widely used for payments in the economy, such deviations would be a departure from the singleness of money and compromise confidence in them and their general acceptance in payments.

The Bank is ***not minded at present to prohibit systemic payment stablecoins from being traded on secondary markets****. Rather, its proposed regulatory regime seeks to remove incentives for market participants to exchange systemic payment stablecoins at rates that depart from par. In particular, our approach is to* ***require all issuers of sterling-denominated systemic payment stablecoins to ensure that they can be exchanged at par – that is, without loss of value – for other forms of money****, including a digital pound (if introduced),* ***on demand****.*

The Bank recognises, however, that in future further requirements might be needed to maintain the singleness of money. This might include arrangements to ensure that, when coin holders move between stablecoins and commercial bank deposits, or other forms of money, these transactions are settled between the relevant institutions via accounts held at the Bank. This ***ensures that transactions are settled in central bank money*** *(at par, and with no risk of change in value), which some argue is key to maintaining the singleness of money." (Section 1.3)*

"To realise any potential benefits from transferable tokenised deposit claims and stablecoin arrangements, the Bank is currently considering approaches to ensure singleness can be maintained across both of these innovations. One approach would be for the Bank to develop its wholesale central bank money infrastructure. This could support singleness by enabling settlement in central bank money to be compatible with bilateral exchanges across stablecoins and tokenised deposits." (Section 4.2.5)

Extract from speech by Sasha Mills, Executive Director, Financial Market Infrastructure, Bank of England, 'Innovation in Digital Assets in the Financial System and The Bank' (emphasis added):

"For money to fulfil its functions, it ***must maintain a characteristic that makes it unlike any other asset – it is backed by a promise of the state****. We have a* ***low-risk appetite for a significant shift away from wholesale settlement in central bank money towards private settlement assets*** *(such as from the use of*

stablecoins for wholesale transactions), because settlement in central bank money is the anchor back to the state. This is why we are exploring options to enhance the ability to settle tokenised wholesale transactions in central bank money."

Extract from speech by Sasha Mills, Executive Director, Financial Market Infrastructure, Bank of England, 'Beyond Faster Horses: Wholesale Financial Markets in the Digital Age' (emphasis added):

"Singleness of money – the principle that ***all different forms of money must be exchangeable with each other at par*** *– is fundamental to monetary and financial stability. For this reason we've indicated that we have a* ***low-risk appetite for a significant shift away from current levels of settlement in central bank money to privately-issued forms of money like tokenised deposits.****"*

Extracts from Speech given by Andrew Bailey New prospects for money - speech by Andrew Bailey | Bank of England (emphasis added)

"Let me move on to crypto assets, as another example. These can take two forms currently. What is known as unbacked crypto, of the Bitcoin sort. And, so-called stablecoins – of the Tether, US Dollar Coin sort. The former have no intrinsic value and are highly volatile and best treated as extremely speculative investments. The latter, while used as the settlement asset for transactions in the crypto world, are not robust and, as currently organised, do not meet the standards we expect of safe money in the financial system. In particular, ***both fail the basic tests of singleness*** *and settlement finality. They are not money.*

Much more promising in my view is the prospect of enhanced forms of digital money which satisfy both tests. And this is perfectly possible and achievable.

Let me start with the question of what is such enhanced digital money? I use the word 'enhanced' deliberately. Today, we have money which is entirely held in IT systems. I think enhanced digital is most conveniently defined as a unit of money to which there is the capability to attach a lot more executable actions, for instance contingent actions in so-called smart contracts, which could be simple or quite complex. But ***the key point is that the singleness of money is preserved, it's the utility of money – what we can do with it – that changes not the money itself****. Just to be clear, when we talk in terms of programmable money in this sense, we mean controlled and programmable by owners and users, not by prying authorities. …*

We may also get proposals to create digital money in the form of stablecoins, which could be issued by banks or non-banks. We will shortly set out proposals for regulating systemic stablecoins, under powers contained in the Financial Services and Markets Act 2023. Such ***stablecoins will have to meet the tests of singleness of money*** *and settlement finality."*

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