Stablecoins

July 2023

Where They Came From
Where They Are Now
Where They Are Going Next

Future of Finance

Stablecoins may play a role in the future of finance, but absent robust regulatory frameworks, they will introduce significant risks. If developed and implemented under appropriate regulation, Stablecoins have the potential to reduce costs of cross-border remittances; complement and improve existing payments' infrastructure; provide competition in the payment space; and generate efficiencies when used for more wholesale or back-end functions involving large, regulated entities. However, without an appropriate regulatory framework in place, Stablecoin issuers and arrangements could generate risks to consumers, markets, and—where systemic—financial stability.[1]

1 International Monetary Fund, FinTech Notes, Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements by Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto, Note/2022/008, September 2022, pages 38-9.

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Foreword

As we approach the tenth anniversary of the issue of the first Stablecoin, it is obvious that this form of digital money has been growing in prominence, and to an extent in controversy, in recent years.

With over $130 billion in market capitalisation, the size and significance of the Stablecoin market cannot be ignored.

With size comes responsibility, and today the Stablecoin industry faces a series of challenges which it must overcome if it is to continue to grow.

The first is that central banks are worrying about the impact globally significant Stablecoins may have on their ability to manage monetary policy and financial stability. This concern became clear at the launch of the proposed Libra Stablecoin by Facebook in 2019.

As we approach the tenth anniversary of the issue of the first Stablecoin, it is obvious that this form of digital money has been growing in prominence, and to an extent in controversy, in recent years.

The second challenge is that regulators in all major jurisdictions are worrying about Stablecoins as the vector of contagion from the cryptocurrency markets to the traditional financial system. Central to that concern is just how stable Stablecoins really are, especially in times of stress.

A third challenge is posed by the commercial banks. They are worrying about the increased role that Stablecoins may play in making payments. They are responding by issuing both tokenised bank deposits and Stablecoins of their own.

Finally, the end-users of Stablecoins are not worrying as much as they should about the quality and liquidity of the reserves held by Stablecoin issuers, the independence of the audit of those reserves and indeed their ability to get their money back when markets are chaotic.

The traditional financial economy that has served us for decades is moving to a new digital economy and, whilst digital economies need digital money, it is far from clear yet what form that digital money will take – be it crypto-assets, tokenised bank deposits, central bank digital currencies (CBDCs) or of course Stablecoins, be they issued by banks or non-banks.

So, it is timely to publish an in-depth review of the Stablecoin journey from its beginnings, through the role played by Stablecoins in the cryptocurrency economy, to what role they might play in the future digital economy.

Future of Finance is to be congratulated for taking on this major task in researching and documenting the evolution of this major asset class. I commend this study to you.

Keith Bear
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An Article by R3

Making sense of Stablecoins

Stablecoins have played a key role in decentralised finance (DeFi) but as use cases expand there are some questions that have the larger community stumped. Many of them are about how the financial system will adapt to a future with a variety of digital currencies in circulation. How will Stablecoins be exchanged and valued? Who will be able to issue them? How will they be used domestically and internationally? Alisa DeCaprio, Chief Economist at R3, Austen Appleby, CBDC Product Manager at R3 and Neera Patel, Senior Digital Currencies Product Manager at R3, address these difficult but important questions in ways that are bound to spark a larger conversation about where the digital currencies sector is going next.

Does the world need both CBDCs and Stablecoins?

From a technology perspective, central bank digital currencies (CBDCs) and Stablecoins are nearly identical. Both represent money, and each performs the same functions (with some nuance with respect to the irrevocable and unconditional transfer of value). Where they diverge is in terms of the issuing entity and what is represented by the token.

So far, the different configurations in which Stablecoins and CBDCs exist or coexist is best explained by jurisdictional differences. Most jurisdictions today only have one of the two instruments available. The most common example is countries without CBDCs. If the central bank has not issued a CBDC, Stablecoins are the only option for a digital currency representing money. As Stablecoins (or more precisely, unregulated variants of Stablecoins) have preceded CBDCs by nearly ten years, there are numerous examples of Stablecoin-only arrangements.

On the CBDC-only side, the People's Republic of China (PRC) is actively promoting its CBDC and discouraging the use of Stablecoins. In order to promote uptake on the e-Yuan, the People's Bank of China, has instituted an outright ban on all other forms of digital currency, including Stablecoins.

There are also jurisdictions that see utility in cultivating both Stablecoins and CBDCs. Members of the Federal Reserve Bank of New York, for example, have just participated in a project[1] exploring an economy-wide business network whereby the central bank would provide CBDC to regulated banks, and those banks that would in turn provide liquidity in the form of a Stablecoin to their customers.

Beyond availability, CBDCs and Stablecoins are likely to settle into different use cases. Because CBDCs can only be issued by central banks, it is likely that they will be used for settlement finality, which is a function only central bank-issued money can do. CBDCs have the potential to function as cash in the hands of households and businesses. In other words, CBDCs can be used throughout the economy to make payments for purchases of physical goods and services.

Stablecoins are less likely to be used to make payments and more likely to be used to facilitate transfers of value digitally. This would be unconnected to an underlying purchase of physical goods or services, and would happen between financial institutions or between financial institutions and their clients.

What is the difference between a Stablecoin and a tokenised deposit?

Stablecoins and tokenised deposits are different because of their issuers and the asset that is represented by the token.

At a higher level though, Stablecoins and tokenised deposits share the same baseline concept: a privately issued token that represents an asset to its holder. However, they are adopted by different users in different contexts.

Participants in the DeFi markets, for instance, use Stablecoins. The term is not homogenous, as there can be many different types of issuers and collateral structures and use cases. A useful aide memoire and shorthand – which we use in the next question – is to think of Stablecoins as publicly traded digital currency tokens that are used largely for crypto trades.[2]

Tokenised deposits, on the other hand, are issued by regulated financial entities such as banks. Tokenised deposits have a non-technical feature that sets them far apart from Stablecoins and indeed from other forms of tokenised liabilities such as security tokens. Because of the regulatory structure and banks' fundamental role in maintaining the stability of the financial system, any token that represents bank deposits must follow regulatory compliance measures each time it is transferred. However, as regulators increase the pressure to bring Stablecoins within the regulatory perimeter, the same

1 See The Regulated Liability Network Digital Sovereign Currency White Paper at https://regulatedliabilitynetwork.org/

2 For more on these distinctions, see Tokens: not just for the subway anymore, R3, 12 January 2022, at https://r3.com/blog/tokens-not-just-for-the-subway-anymore/

compliance measures may soon apply to some of them as well.

How can Stablecoins be fungible if each has a unique collateral structure?

Collateralised Stablecoins are a particular category of publicly traded Stablecoin that claim to be backed by assets.

The opacity of the assets backing some Stablecoins are a source of growing consternation among regulators. Any two Stablecoins that claim to hold the value of US$1.00, for example, do not always hold this value. The reason for this instability varies according to the type of Stablecoin. Some hold US dollars but not in the form of cash only and are invested US dollar denominated money market in instruments and securities of varying degrees of liquidity that are not always readily exchangeable for cash at full value. Others are collateralised by different combinations of assets, which may include cryptocurrencies such as Bitcoin and Ethereum as well as other Stablecoins and US dollar denominated assets.

But, if we look at the data on how asset-backed Stablecoins with the same target value trade with each other, they look surprisingly … stable. Most Stablecoins that claim to hold a US dollar peg, for example, USDC and DAI, trade fairly consistently at a 1:1 with only a few fluctuations at times of wider volatility in the cryptocurrency markets. This is despite these Stablecoins having wildly different collateral structures. USDC is backed off-chain by 100 per cent cash and short dated US treasuries whereas DAI is backed on-chain by a range of cryptocurrencies including Ethereum and by the USDC and USDP Stablecoins. This example is not an outlier. In their 2021 Financial Stability Report, the International Monetary Fund (IMF) pointed out that, for top Stablecoins, price deviations from their target pegs have been declining over time – at least outside markets that are volatile for other reasons.[3]

An explanation why even Stablecoins backed by different sets of collateral can be consistently fungible is found in the performance of conventional currency pegs. Several existing currencies are pegged to the US dollar. The Dirham that circulates in the United Arab Emirates (UAE), for example, has maintained its US dollar peg since 1997. Anytime countries in this group have a disrupted peg, the central banks conduct open market operations to return to balance.

The open market operations used in currency peg arrangements highlight an important factor. Open market operations are *open*. So, although the collateral backing Stablecoins does not need to be homogeneous, it does need to be transparent. Regulators have made considerable progress in encouraging this. In 2021 the Commodity Futures Trading Commission (CFTC) fined Tether, issuer of the USDT Stablecoin, US$41 million for "making untrue or misleading statements and omissions of material fact" about the assets backing USDT. Tether now publishes its consolidated reserves regularly. In June 2022 the New York State Department of Financial Services (NYDFS), which regulates a number of Stablecoin issuers, published guidelines on the nature of the reserve assets eligible to back Stablecoins. The assets backing the USDC, USDP and BUSD Stablecoins are now disclosed. Although there is currently no standard requirement for protecting reserves, maintaining the liquidity of reserves or compensating investors, the Financial Stability Board (FSB) has published regularly updated recommendations, at the behest of the Group of Twenty (G20), which regulators in the major financial markets are passing into national law.

Stablecoins (and CBDCs) only exist digitally, so what happens when the energy supply is disrupted?

When was the last time your mobile telephone died? Probably sometime in the last week. This raises an important and complicated question about Stablecoins. If currency is natively digital, then it will not be accessible if you are not connected. If connectivity is a problem, you might be disinclined to use digital currencies at all. One of the reasons why the PRC includes extensive offline implementation access to its CBDC is that 30 per cent of its citizens do not have access to the Internet.

While no location is completely safe from power outages, the frequency of outages varies greatly between regions and countries. Generally, power outages increase as you move from urban to rural areas, and from advanced economies to emerging ones. But it is the duration of the outage that matters. A power outage lasting an hour or a day may force people to limit telephone usage or delay a particular purchase. A power outage lasting a week or more may leave people without any access to electronic devices and services at all, whether they be online or offline, battery-powered or connected to a national grid.

Today, if there is not consistent access to electricity or the Internet, or both, users will be unable to initiate Stablecoin transactions. Even though a user can hold their keys offline, the token itself is still held on the ledger. In this configuration, you must interact with the "main-net" ledger via both electric power and the Internet in order to complete any transactions. In other words, Stablecoins are unusable without connection to the Internet and reliable access to power.

There are two technical solutions in use today that could be re-purposed to solve short-term power outages. Apple and Google Pay both use secure enclaves in the mobile device that are able to store and save a number of keys that are used to sign a limited number of transactions offline. This works in tandem with battery-powered, offline terminals.

In combination with this

3 See International Monetary Fund, October 2021, Chapter 2, "The Crypto Ecosystem And Financial Stability Challenges."

secure enclave key storage mechanism, Stablecoins can also be transacted with in a low-power, offline scenario. Thales, for example, has proposed a method of offline "transaction chaining" in which a token is downloaded from an online ledger, and when it is used in a transaction, the token and its backchain (the previous owners) are sent messages simultaneously. This ensures the recipient can confirm the validity of the token as long as they can confirm the original download transaction. The recipient can then re-upload their token when re-connected to power and the Internet.

But even Stablecoins with low-power and offline solutions still require semi-consistent recharging and reconnection to the Internet. It follows that access to reliable power sources and the Internet are necessary prerequisites for Stablecoin adoption. This is often forgotten, amid concerns about non-technical prerequisites, such as public trust in a commercial issuer and issuance. In locations where power outages commonly last for extended periods, or there is little consistent access to power at all, Stablecoin adoption is unlikely to happen rapidly.

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Summary

Stablecoins were invented to overcome the lack of fiat currency to complete cash payments on blockchain networks. Backed by cash, money market instruments and funds and bonds, or by other assets including cryptocurrencies, they are now used not only to pay for digital assets but have since 2019 been used to support cryptocurrency trading and financing strategies too.

The market value of Stablecoins has increased, their uses have diversified, and they have come to support a complex operational infrastructure of exchanges, trading platforms, lending and borrowing protocols and custodians.

As a result, regulators have taken a growing interest in Stablecoins as a threat to financial stability (by undermining the deposit financing of commercial banks and disturbing the money markets) and control (through regulated banks) and an area in need of investor protection but also as an opportunity to improve market efficiency (notably in cross-border, cross-currency payments).

International regulators were already well-embarked on an initiative to regulate Stablecoins when in May 2022 the Terra algorithmic Stablecoin collapsed, prompting a run on other Stablecoins and a flight to higher quality alternatives. Other algorithmic Stablecoins also failed. The episode undermined confidence that Stablecoins in general, and algorithmic Stablecoins in particular, could be stable.

Algorithmic Stablecoins reliant on arbitrageurs to realign prices have proved particularly vulnerable to collapse for various reasons, including market manipulation and hacking, but mainly because they lack the underpinning of a liquid market, leaving them reliant on interactions between small classes of investors and professional arbitrageurs that are apt to become self-reinforcing.

Asset-backed Stablecoins, on the other hand, which invest in various combinations of bonds and bills, and bank deposits, exhibit much lower levels of volatility than algorithmic Stablecoins, fluctuating mainly at times of wider market stress only. They are also less volatile than Stablecoins backed by cryptocurrencies, even when these are expensively over-collateralised.

But in truth even the most conservative, asset-backed Stablecoins rest on an inescapable tension. They must invest the cash subscribed by their holders in income-producing assets to cover their operating costs, but those assets may be issued by issuers that fail or prove hard to sell for full value in a crisis, when holders want their cash back.

All asset-backed Stablecoins are invested in some combination of government bills, government securities, money market funds and bank deposits, although some have also purchased commercial paper (a practice now discouraged by regulators). The risks of the issuer defaulting, or the deposit-taking bank failing, are low but do exist.

This means Stablecoins behave more like money market funds than money. In 2008 and 2020 money market funds had to be rescued by central banks as lenders-of-last-resort even though, as non-banks, they were not entitled to such support. Subsequent regulatory efforts to avoid a recurrence of the money market fund crises have failed to rectify an underlying vulnerability to “runs” caused by panicking investors reclaiming their money.

So it is not surprising that regulators are concerned that, in stressed markets, Stablecoins will indeed behave like money market funds. In March 2023, when a number of banks which accepted deposits from Stablecoin issuers failed or elected to close, that concern became real. The government rescued depositors, just as it had previously rescued investors in money market funds.

Even before the banks got into difficulty, regulators in the United States had, in the aftermath of the Terra debacle, pushed non-bank Stablecoin issuers to disclose details regularly about the assets in which they invested their reserves, and encouraged them to restrict their portfolios to a narrower range of low-risk, high-liquidity and mainly sovereign investments.

There are other reasons regulators are bringing Stablecoins within the regulatory perimeter. These include the fact that Stablecoins function not only as a means of payment in the cryptocurrency markets but are used routinely to provide collateralised credit to traders in those markets.

Indeed, some analysts argue that, in facilitating credit creation, as well as by investing heavily in the

commercial paper and repo markets, Stablecoins are part of an unregulated "shadow banking" system comparable to that which developed in the prelude to the great financial crisis of 2007-08. Such claims exaggerate the size of the Stablecoin industry but are not entirely wrong.

Stablecoins were invented chiefly for the benefit of professional traders. Traders rely on Stablecoins to park profits awaiting reinvestment on a blockchain network but outside the highly volatile marketplace without incurring the costs of converting them into fiat currency through the banking system; to trade around-the-clock; to switch between blockchain networks; and to lend and borrow assets for profit.

It is the existence of this class of professional traders that persuaded issuers of algorithmic Stablecoins that there were enough active arbitrageurs to ensure their stabilisation models would always work by reducing the supply of the Stablecoin when the price fell and increasing it when the price rose. These models did provide some traders at some times with low-risk profit opportunities.

But restoring currency pegs, by collecting as profit the discount or premium on price movements, is not the primary activity of cryptocurrency traders. This condemned the arbitrage mechanisms of algorithmic Stablecoins to reliance on limited numbers of buyers and sellers. Ample experience has now proved that, when confidence fails, buyers are absent.

This is why most algorithmic Stablecoins have not succeeded. Indeed, so many have now failed that regulators see no need to regulate them, because they are too small and unstable to warrant their attention. Regulators are, however, interested in the links between cryptocurrency markets and conventional markets, and see asset-backed Stablecoins as a crucial link between them.

The reliance of cryptocurrency exchanges on Stablecoins to facilitate switching by investors between marketplaces, and the concomitant reliance of Stablecoin issuers on cryptocurrency exchanges to host the purchase and sale of their Stablecoins and keep customer holdings in custody, creates risks of commingling and re-use of Stablecoins by exchanges and "runs" on Stablecoins if an exchange fails. In the United States, exchanges are now obliged to accept liability for loss of customer assets.

But the earliest regulatory obligations laid on Stablecoins concern financial crime, because regulators identified the cryptocurrency markets – and Stablecoins as a core component of them - as a conduit for laundered money and terrorist financing almost as soon as the original cryptocurrency (Bitcoin) was launched. Since 2018, Stablecoin issuers have had to check users are not financial criminals, but enforcement at the national level is slow and patchy.

What finally triggered serious regulatory interest in Stablecoins was the announcement by Facebook in June 2019 that it was planning to issue a global Stablecoin called Libra. By potentially undermining the funding basis, credit creation capabilities and payments businesses of banks, Libra represented a threat to the stability and control by central banks of the entire established financial system.

It is at this point that the notion of regulating Stablecoins as banks, and ultimately subjecting them to all the onerous risk management, recovery and resolution and capital and liquidity obligations laid on banks, was born. At the behest of the G20, the FSB drew up and published in 2020 ten Recommendations designed to standardise the regulatory treatment of Stablecoins on a bank-like model.

Reviewing compliance in October 2022, the FSB concluded that none of the largest non-bank Stablecoins satisfied its ten Recommendations, especially in terms of governance, risk management, redemption rights, stabilisation mechanisms and reserve disclosures. The FSB also expressed concern that, even where the Recommendations were being implemented, there was a risk of regulatory fragmentation leading to regulatory arbitrage.

Accordingly, the FSB paper of October 2022 included a series of revisions to its ten Recommendations designed to instil a sense of urgency among national regulators.

To further encourage them to act the FSB has promised to finalise its Recommendations for the regulation, supervision and oversight of Stablecoins by July 2023 and to complete a further review of implementation by the end of 2025.

Regulators are alive not just to the risks but to the opportunities created by the innovation and competition Stablecoins bring to incumbent service providers. Chief among the positive possibilities is fulfilment of a G20 priority: cheaper, faster, more accessible and more transparent payments, especially across borders and

currencies, and especially for remittances. Unexpectedly, the focus of the G7 Working Group on Stablecoins report of October 2019 was primarily on payments. It argued that putting Stablecoins on a sound regulatory and especially legal footing - including proper governance and assurance about the quality and whereabouts of reserve assets – delivered not just the benefits of a reduction in risk but a wave of innovation and competition.

The maintenance of competition depends on ensuring Stablecoins do not enjoy a competitive advantage through lighter regulation. Accordingly, the FSB and the G7 were at one in subjecting (systemically important) Stablecoins to the PFMIs that oblige important payments market infrastructures (PMIs) to meet credit, collateral, liquidity and operational risk management standards; achieve settlement finality; protect customer assets and data; and adopt and use industry standards.

Competition also depends on ensuring systemically important Stablecoins do notachieve a position of global dominance in payments. The Facebook-Libra episode alerted international regulators to the fact that the likeliest issuers of a globally dominant Stablecoin are global technology and social media platforms, with their installed international client bases and ability to capitalise on network effects.

Subjecting Stablecoins to the full panoply of regulations that govern banks and PFMIs, although yet to be implemented, has already successfully crushed the possibility of any non-bank Stablecoin disrupting the status quo. Libra in particular was at first heavily constrained, and eventually sunk altogether by lack of regulatory endorsement for a Stablecoin armed with such a powerful global audience and the associated network effects.

The obvious long-term regulatory counter to Stablecoins is CBDCs. They would almost certainly displace Stablecoins as the solution to the problem Stablecoins were invented to solve – the need for cash on blockchain networks – and could also play a part in making cross-border, cross-currency payments cheaper, through intermediaries or linking of central bank settlement systems.

But no major jurisdiction has yet issued a CBDC. Instead, regulators are focused on bringing Stablecoins within the scope of an agreed set of regulatory principles. Regulators in the United States, the European Union, the United Kingdom, Hong Kong, Japan and Singapore are now following a single consensual model outlined in the work of the G20 and the G7 and their agent the FSB.

The consensual model leaves algorithmic Stablecoins firmly outside the regulatory perimeter. It also restricts issuance of regulated Stablecoins to regulated banks, insists the assets backing the Stablecoin must consist of the highest quality domestic money market instruments and be fully disclosed to users. The model also expects issuers of Stablecoins to meet minimum standards of governance.

Capital requirements are likely to be imposed on non-bank as well as bank issuers of Stablecoins. Regulators in Singapore has recently adopted this approach. The BIS has already published demanding new capital rules for banks that issue, invest in or safekeep digital assets, including Stablecoins, which come into force in January 2025.

The various measures amount to privileging licensed, regulated banks as issuers of Stablecoins. It reduces the risk of banks losing their funding and ability to lend and of central banks having to extend lender-of-last resort facilities to non-banks. Privileging banks also ensures that the role of Stablecoins in facilitating payments domestically and across borders remains largely inside the most impregnable regulatory perimeter.

Although it is questionable whether any bank has yet issued a true asset-backed Stablecoin, banks are experimenting with tokenised deposits which, although they are pegged 1:1 to fiat currencies, rely for their stability not on reserves but on remaining a liability of the issuer. They are confined to internal networks, enabling clients of the same bank to exchange value efficiently. Extending their benefits more widely depends primarily on the development of suitable data exchange standards.

While algorithmic Stablecoins are anathematised by the regulatory consensus, the regulatory status of non-bank Stablecoins is not yet clear. However, it is more likely that they will be regulated in the same way as bank-issued, asset-backed Stablecoins than as cryptocurrencies, where regulators are also introducing tighter supervision and controls to reduce financial crime, enhance investor protection and mitigate the risk of instability spilling over into the established financial markets through a variety of conduits.

It is likely that most non-bank issuers of Stablecoins will seek banking licences, for commercial and reputational reasons. The growth of wider markets in tokenised assets will encourage a preference for full regulatory status, including banking licences, because institutional investors will demand it.

Regulators will welcome this development, to avoid lightly regulated Stablecoins operating on fragile operational infrastructures becoming the main payment mechanism in tokenised markets.

Wider economic trends, such as the growth in global e-commerce and the scope for massive savings in transactions costs and the costs of liquidity, will further accelerate the trend towards regulatory respectability in the Stablecoin industry, especially in the absence of widely available CBDCs in the major currencies – and perhaps even when CBDCs are issued as well, given the reluctance of central banks to provide customer-facing services and the greater freedom of Stablecoin issuers to innovate.

Introduction

Stablecoins were invented to solve a problem. That problem was the absence of fiat currency in a fully digital form on the blockchain networks where crypto-currencies, the earliest of the digital assets, are bought and sold. Without digitised fiat currency in either central bank or commercial bank money form, it is impossible to settle the cash leg of digital asset transactions.

Those transactions have now achieved an extraordinary variety. They are no longer confined to the purchase and sale of cryptocurrencies. Transactions now encompass even the exchange of a variety of tokenised assets. But the primary utility of Stablecoins lies in supporting professional trading and financing strategies in both cryptocurrencies and the tokens offered by Decentralised Finance (DeFi) protocols.

Stablecoins, being cryptographically secured, tradeable round-the-clock and programmable for payments services, have proved admirably suited to support spot and derivative trading activities. Indeed, the growth in the value of Stablecoins in 2021 was closely linked to the growing value of the tokens associated with DeFi protocols in the same period, driven by the trading activities of a small class of trading houses and hedge funds.[2]

Although the first fiat currency backed Stablecoin (US Tether or USDT) was introduced on the Bitcoin Cash Simple Ledger Protocol (SLP) as long ago as July 2014 – the cryptocurrency-backed Bit USD was launched the same month - Stablecoins really surged in number and value from 2019 onwards. US$132.9 billion in April 2023[3], well below the summer 2022 peak of more than US$160 billion but still 50 times the value of the Stablecoin market at the beginning of 2019. Just four Stablecoins account for 95 per cent of market value.

A complex infrastructure of custodians and especially exchanges has developed to issue, redeem and safekeep the Stablecoins traded by arbitrageurs and market-makers. The biggest Stablecoin – USDT – is traded on nearly 400 cryptocurrency exchanges. The reserves that back the ability of a Stablecoin to offer one-to-one redemption for US dollars or other fiat currencies are generally held by independent custodians.

Stablecoins, like transaction types, have increased in variety beyond their original form of digitally native payment and store-of-value instruments on a blockchain. They are now backed by cash, money market instruments, securities and cryptocurrencies. The term Stablecoin is used loosely to encompass tokenised deposits that are not Stablecoins at all but liabilities of the issuing banks and unbacked Stablecoins whose stability is supposedly guaranteed by algorithmically determined arbitrage trades.

As Stablecoins have developed and diversified, and found new uses, they have attracted the attention of regulators. Regulators have seen Stablecoins as, variously, a competitor for commercial bank funding via deposits, a menace to financial stability, a threat to the control of the financial and monetary system that central banks exert through regulated and centralised commercial banks and an area in need of investor protection rules but also as a potential solution to the excessive costs of cross-currency payments.

Unlike the cryptocurrencies they were originally invented to support, Stablecoins have the potential to disrupt the existing financial system. They are money-like in providing a store of value; could become a popular means of transferring value across borders and between currencies; and depend on collateral that is usually invested in the securities of issuers and bank accounts that operate within the regulatory perimeter of the current financial system.

By 2019 these concerns and possibilities had inspired an international initiative, driven by national central banks, to regulate Stablecoins. A consensus emerged quickly, spanning all the major financial market jurisdictions, on how to regulate Stablecoins in ways that maintain financial stability, safeguard retail investors and deter financial criminals without discouraging financial innovation.

The consensus has a clear preference for regulated Stablecoins to be issued by regulated banks and backed not only by high quality liquid assets but by the deposit insurance schemes, lender-of-last-resort facilities and capital adequacy rules to which banks are subject. Above all, the consensus anathematises algorithmic Stablecoins. Though this last decision was predictable from an early stage, a series of events in the Spring of 2022 rendered it unarguable.

2 Some analysts have argued that this link is not merely symptomatic. On this view, Stablecoins are not neutral but facilitate market activities that inflate cryptocurrency prices. See John M. Griffin and Amin Shams, Is Bitcoin Really Untethered?, The Journal of Finance, April 2020.

3 https://www.coingecko.com/en/categories/stablecoins

The collapse of the Terra Stablecoin

In the late spring of 2022, a major Stablecoin failed spectacularly to live up to its name. Terra, an algorithmic Stablecoin pegged to the LUNA cryptocurrency token, collapsed. When the price of LUNA imploded in just 48 hours from nearly US$120 to effectively zero, the value of the Terra Stablecoin followed suit, collapsing from its 1:1 peg to the US dollar to just a few cents. Chart 1 illustrates graphically what happened in May 2022.

When its collapse began, Terra was not a minor or obscure element in the Stablecoin universe. It was the third most valuable Stablecoin after the much better-known Tether (USDT) and the USD Coin (USDC) issued by peer-to-peer payments company Circle in September 2018 (with the later support of the Coinbase cryptocurrency exchange). Terra also nursed the ambition to be the global payments instrument throughout the DeFi markets. When it collapsed, Terra had a market capitalisation (US$41 billion) close to that of USDC (US$48 billion) and getting on for half that of the longstanding market leader USDT (US$83 billion).

Unsurprisingly, the collapse did not leave USDC or USDT untouched. USDC, long the most transparent and regulation-friendly Stablecoin, spiked upwards to a peak of US$1.0075 in a flight to quality, the solidity of its reserves ensuring it was the least affected of any Stablecoin.[4] USDT, on the other hand, dipped below its US$1.00 peg on secondary markets on 7 May, trading as low as US$0.95 on 12 May, and did not regain par until July.

From its peak valuation on 7 May 2022 and the bottom of the fall, the total value of USDT coins in issue fell by a fifth. The combined value of the top 16 Stablecoins plunged in the same period by a similar amount, from US$180 billion to US$144 billion. In other words, US$36 billion evaporated, not in cryptocurrencies - where pretty much everyone understands the risks and expects a high degree of volatility - but in *Stable*coins.

4 Hong Kong Monetary Authority Research Memorandum, An Event Study on the May 2022 Stablecoin Market Crash, 24 November 2022, page 8. The study reached the common-sense conclusion that "the presence of quality reserve assets is the most important determinant of the run pressures on a Stablecoin" (page 17).

Why Stablecoins can never be completely stable

Yet the episode also felt familiar. The dismay which greeted the collapse of Terra was reminiscent of the consternation that accompanied the news on 16 September 2008 that the Reserve Primary money market fund - the oldest in America - had "broken the buck" – in other words, the Net Asset Value of the fund (NAV) fell below US$1.00 - when its investment in commercial paper issued by the bankrupt Lehman Brothers turned out to be valueless.

The news precipitated a "run" on money market funds as a whole, in which investors redeemed their holdings *en masse*. The "run" was halted only by the provision of public money. In the second half of September 2008, the Federal Reserve alone spent US$150 billion to maintain the US$1.00 net asset value of money market funds. Over the next two years 62 money market funds on both sides of the Atlantic needed assistance to avoid "breaking the buck."

This happened despite the fact that in principle money market funds, unlike bank deposits, do not benefit from formal access to official support and central bank lender-of-last-resort facilities. Unsurprisingly, the experience precipitated a string of regulatory initiatives spanning not only the United States and the European Union (EU) but Canada, China, India and South Africa as well.

Those early initiatives focused mainly on the asset side of money market funds. In the United States, for example, the Securities and Exchange Commission (SEC) required funds to cease promising a stable price, maintain a portion of their portfolios in instruments that can be readily converted to cash, reduce the weighted average maturity of portfolio holdings, and improve the quality of assets held. It even allowed funds that had "broken the buck" to suspend redemptions so assets could be liquidated in an orderly fashion.[5]

Within the EU, regulators from July 2011 divided money market funds between "short-term money market funds" (ST-MMFs) and "money market funds" (MMFs) and imposed strict standards in terms of portfolio quality and maturity, risk management and disclosure. After these measures were adopted in only 12 member-states, the EU in 2017 agreed a Money Market Fund Regulation that imposed asset quality, duration and liquidity rules on every member-state.[6]

The Group of Twenty (G20), working via the Financial Stability Board (FSB), launched an effort to internationalise the asset type limits, liquidity minimums and portfolio maturity caps that had emerged. In 2012, at the behest of the FSB, the International Organisation of Securities Commissions (IOSCO) published 15 recommendations that embodied this ambition.[7]

Unfortunately, none of these measures worked – and not only because American regulators refused to endorse the IOSCO recommendations. There were subdued runs on American money market funds in 2011 during the European sovereign debt crisis, and a suspension of subscriptions by some funds in 2012 when interest rates fell close to zero.

This last episode highlighted a structural flaw in money market funds: they depend on keeping operational costs well below the short-term interest rate spread, which is difficult when interest rates are exceptionally low, especially if regulation demands high levels of short-term liquidity and forbids diversification into riskier assets.[8]

5 Securities and Exchange Commission, Money Market Fund Reform, Final Rule, 2010. The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 sought to limit the "moral hazard" of excessive risk-taking by money market fund managers by limiting the ability of the US Treasury and the Federal Reserve to create backstop facilities for money market funds.

6 Regulation (EU) 2017/1131 of the European Parliament and of the Council of 14 June 2017 on money market funds.

7 International Organisation of Securities Commissions, Policy Recommendations for Money Market Funds, Final Report, October 2012.

8 The obverse of this structural flaw is that, when interest rates rise, as they have since early 2022, money market funds prosper. Higher interest rates benefit Stablecoins for the same reason.

But it was the events of March 2020 that finally exposed the limits of regulation. That month, at the outset of the Covid 19 pandemic, the Federal Reserve had to rescue money market funds all over again after investors redeemed US$125 billion in a matter of days. Indeed, the most contentious change made since 2008 – allowing managers to "gate," or halt, redemptions – only made the problem worse.

Once again, the FSB has promised to work on improving the liquidity mismatch intrinsic to money market funds. It will review progress on previous measures and update its earlier recommendations. The FSB will also gather more data from money market funds for monitoring purposes, and work with IOSCO to develop "detailed guidance on liquidity management tools" for money market fund managers.[9]

The liquidity mismatches money market funds and the most conservative, non-algorithmic, asset-backed Stablecoins face is, essentially, the same. As one analysis urging regulation of Stablecoins put it in 2021: "If policymakers wait a decade, Stablecoin issuers will become the money market funds of the 21st century—too big to fail—and the government will have to step in with a rescue package whenever there's a financial panic." [10]

Indeed, the International Monetary Fund (IMF) has urged regulators to draw on the experience of regulating money market funds – in terms of specifying the liquidity, maturity, credit quality and diversity of underlying assets and by adapting redemption gates - when devising regulations for Stablecoins.[11]

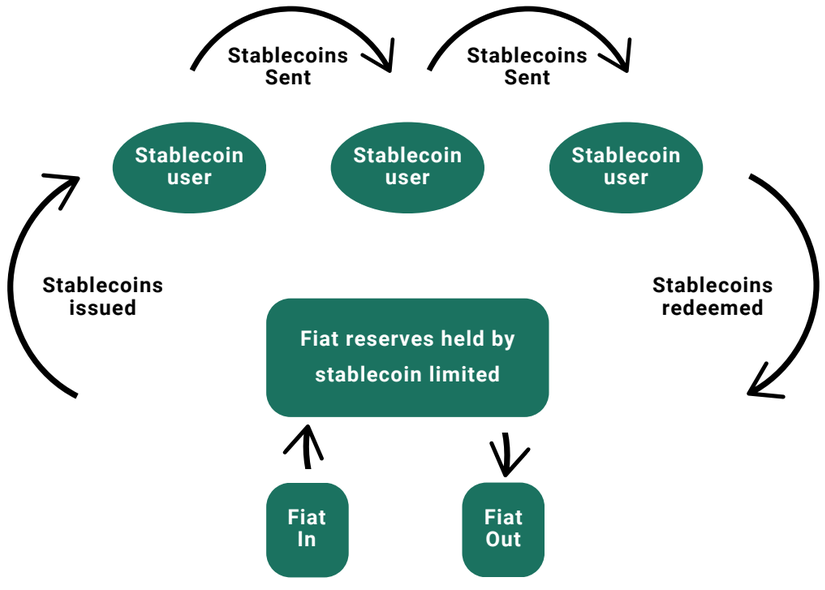
As if to emphasise the similarities, Stablecoin issuers (including Tether) invest their reserves in money market funds.[12] Circle, issuer of USDC, the second largest non-bank Stablecoin, has further underwritten the closeness of the two instruments by choosing to invest the majority of the assets backing its Stablecoin in a special money market fund managed by asset manager BlackRock (which has also invested in Circle).

Like money market funds, Stablecoins reinvest the cash of their investors. If they invested it in nothing but genuine cash in the form of bank deposits, their stability would be assured – at least up to the point at which there is a "run" on the bank or banks holding the deposits[13] but there would be no incentive for anyone to set one up because there would be no interest rate spread to cover the costs of operating the coin and providing a return to the issuer.

As the decision by some money market funds to refuse subscriptions back in 2012 proves, when interest rates fall too low, accepting investors' money becomes unprofitable anyway. Just as money market funds cannot compete with banks if they hold nothing but bank deposits, nobody would establish and operate a Stablecoin unless the reserves held against it produced income.

This is what introduces that irreconcilable contradiction Stablecoins: to be genuinely stable, they would have to hold assets which render them commercially unviable.

It is why regulators never forced money market funds to restrict their investments to risk-free assets – and one reason why regulators adopted a cautious approach to regulating Stablecoins more aggressively in the wake of the crash of May 2022.



9 Letter from FSB chairman Klaas Knot to G20 Finance Ministers and Central Bank Governors, 20 February 2023, page 2.

10 Gary B. Gorton and Jeffery Y. Zhang, Taming Wildcat Stablecoins, 30 September 2021, page 6.

11 "Stablecoins and Lessons from Money Market Funds and E-Money Regulations" in International Monetary Fund, FinTech Notes, Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements by Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto, Note/2022/008, September 2022, page 26. The paper also urges regulators to note lessons from e-money regulations, especially in terms of segregating and insuring underlying assets.

12 See Consolidated Reserves of the USDT Stablecoin, page 47.

13 This eventuality was realised in March 2023, when the Silicon Valley Bank failed, Silvergate Bank opted to close, and Signature Bank was closed by regulators. See page 48 below.

Are Stablecoins “shadow” banks?

The obvious solution is to regulate Stablecoins as banks. After all, like money market funds, Stablecoins compete with banks for deposits. Also like money market funds, which became major buyers of non-bank forms of credit such as commercial paper and repos, Stablecoins enable the creation and consumption of non-bank credit through collateralised lending and trading.

Again, like money market funds, Stablecoin issuers supply these services without the regulatory constraints imposed on banks. They are not yet obliged to raise capital and allocate it proportionately to risks or maintain a prescribed liquidity ratio.[14] Their senior managers are not personally accountable for their decisions. They do not have to pay premiums to deposit insurance schemes or formulate disaster recovery and insolvency plans.

This comparative freedom of action has prompted some critics to liken Stablecoins to the so-called “shadow banking” system that developed outside the reach of regulation in the run-up to the great financial crisis of 2007-08. Money market funds were a key component of that system. Indeed, it was their appetite for commercial paper and repo that fuelled the expansion of non-bank borrowing by corporations and investment banks.

“Shadow banking” presented conventional banks with the original threat of disintermediation: the liability side of their balance sheet (deposits) would defect to money market funds and the asset side of their balance sheet (loans to other banks and corporations) would defect to the commercial paper and repo markets. By 2007, it was real: “shadow banks” were generating more credit than banks.

It was this steadily mounting threat of disintermediation that persuaded the banks (and savings banks) to lobby for the removal of caps on the interest rates they could charge; the elimination of restrictions on borrowers they could lend to; and the lifting of controls on their engagement with the securities and derivatives markets, and especially interest rate, currency, equity, credit and commodity swaps.

The origins of every financial disaster of the last 40 years, from the rescue of Continental Illinois in 1984, through the Savings & Loan crisis of the 1980s and early 1990s, to the failures of Northern Rock and Lehman Brothers in 2007-08, can be traced to this competitive tension over the provision of credit between conventional and non-conventional banking.

So it is not surprising regulators became anxious about Stablecoins as they took off in 2019 and especially after the algorithmic Stablecoin collapse of May 2022. On 12 May 2022, US Treasury Secretary Janet Yellen said the run and decline in value of the asset-backed USTD Stablecoin in the immediate aftermath of the Terra/LUNA debacle demonstrated the urgency of establishing aregulatory framework to cope with the threat to financial stability posed by Stablecoins.

Four days later, Fabio Panetta, a member of the Executive Board of the European Central Bank (ECB), made publicly the obvious point that Stablecoins were vulnerable to runs because they were not supported by deposit insurance schemes or central bank lender-of-last resort facilities.[15]

For now, regulators face a manageable problem. The value of Stablecoins has stopped growing, and they were not large by comparison with the original “shadow banking” industry anyway. Coinmarketcap put the total market capitalisation of the entire Stablecoin industry at US$132.7 billion in April 2023.[16] This is, by way of comparison, one ninety-eighth of the US$13.0 trillion value of the US shadow banking industry alone in 2007.[17]

14 However, from 1 January 2025 banks that hold Stablecoins will have to allocate capital to them according to their perceived degree of riskiness and illiquidity. See Basel Committee on Banking Supervision, Prudential treatment of crypto asset exposures, December 2022, page 18.

15 Fabio Panetta, Public money for the digital era: towards a digital euro, keynote speech by Fabio Panetta, Member of the Executive Board of the ECB, at the National College of Ireland, Dublin, 16 May 2022. He said: “So-called Stablecoins have emerged and have the potential to become globally systemic, especially if issued by big techs. But while the value of Stablecoins is linked to what their issuers describe as `reserve assets’ and adequate regulation and oversight could reduce risks, Stablecoins are not risk-free. There is no guarantee that they can be redeemed at par at any time – just last week the world’s biggest Stablecoin temporarily lost its peg to the dollar. And Stablecoins do not benefit from deposit insurance, nor do they have access to central bank standing facilities. They are therefore vulnerable to runs, as we have just seen with the crash of another Stablecoin – Terra USD.”

16 https://coinmarketcap.com/view/stablecoin/

17 The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States, January 2011, Figure 2.1, page 32.

Terra is not the only algorithmic Stablecoin to have faltered

Yet regulators still have grounds for concern. The first is that Terra USD is not the only Stablecoin to have faltered. In April 2021, the failure of the newly launched FEI algorithmic Stablecoin to hold its peg to the US dollar in early trading – it has since recovered to trade in a relatively narrow range of approximately US$0.96 to US$1.02, at a modest market capitalisation by comparison with the major Stablecoins - was blamed on a flawed design.

In June 2021, the price of the IRON Stablecoin lost its peg to the US dollar after the price of the TITAN token that backed it fell to zero, as a result of a design flaw – namely, delays in receiving prices from a price feed "oracle" that made arbitrage trades unprofitable - that prevented arbitrageurs stabilising the price by buying IRON and swapping it for TITAN.[18]

In late July 2022 the NIRV Stablecoin lost its peg to the US dollar and fell below 10 cents after succumbing to a "flash loan attack," a trading technique by which borrowed money was used to manipulate the price of the associated ANA token and drain the reserves (see Box).[19] The Stablecoin has not yet restored the peg; indeed, it continues to trade close to zero.

The Beanstalk Stablecoin was also attacked using a "flash loan." The attackers used the loan to purchase a majority of the governance tokens of the Stablecoin and voted to transfer its reserves to their private wallet. They used the proceeds to pay off the loan and pocketed the remainder of the funds themselves.[20]

In mid-August 2022, hackers exploited a software bug to mint billions of Acala tokens, undermining the US dollar peg of its native Stablecoin (aUSD). After the attack, the price of aUSD fell from US$1.03 per token to less than US$0.001. It has since recovered to trade between US$0.60 and US$0.80, following efforts to destroy the erroneously printed tokens.

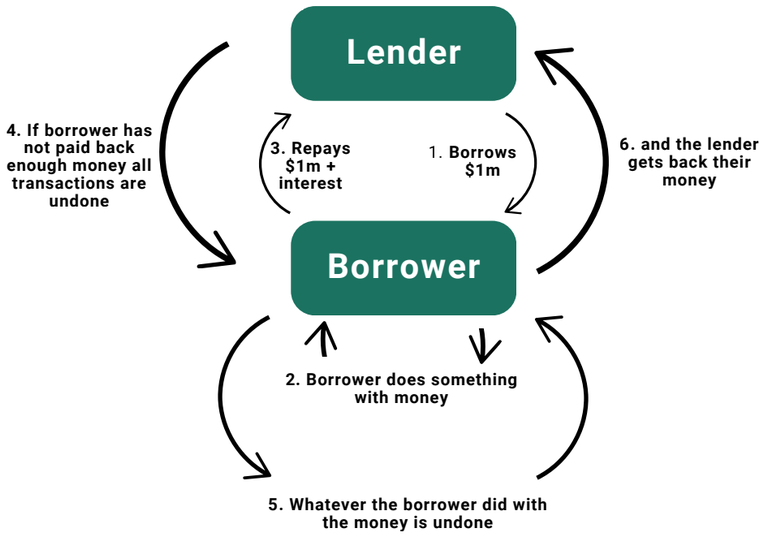
18 Ciphertrace, Analysis of the TITAN Token Collapse: Iron Finance Rugpull or DeFi Bank Run?, 21 June 2021.

19 In a "flash loan" attack, the loan and its repayment are recorded in a single block on a blockchain, closing the position at the same time it is created.

20 Alex Hern, "Beanstalk cryptocurrency loses $182m of reserves in flash 'attack,'" The Guardian, 18 April 2022"

NIRV: The NIRV Stablecoin conformed to the Robert Sams[21] model that lies behind most algorithmic tokens in that it was paired with the ANA token. NIRV was backed by holdings of Stablecoins such as USDH (a Stablecoin issued on to the Solana network by the operators of the Hubble DeFi protocol), USDC (the Stablecoin developed by Coinbase and Circle), FRAX (a hybrid of a collateral-backed and an algorithmic Stablecoin issued by FRAX Finance) and USDT (the Stablecoin issued by Tether). The price at which ANA tokens could be exchanged for NIRV Stablecoins was set at US$1.00, effectively setting what Nirvana Finance called a "minimum intrinsic value" or "floor price" for ANA tokens. If the spot price of ANA rose to US$20.00, for example, holders of NIRV could buy one ANA token for 20 NIRV. Similarly, holders of ANA tokens could get 20 NIRV tokens for every one ANA token they held. In theory, this structure created the opportunities for arbitrageurs to exploit if the price of NIRV strayed too far from US$1.00 per ANA token. If NIRV traded below US$1.00, arbitrageurs could purchase NIRV at, say, US$0.95 and uses the NIRV to buy ANA at US$1.00, locking in a US$0.05 profit. If NIRV traded above $1.00, on the other hand, they could purchase ANA with one of the Stablecoins that backed NIRV, swap the ANA for NIRV at US$1.00, and then sell the NIRV in the market at, say, US$1.05 – again locking in a US$0.05 profit. Importantly, ANA was exchangeable not just for NIRV but for any of the Stablecoins which backed it. In late July 2022, this exposed NIRV to a classic "pump-and-dump" trade - the "flash loan attack"- in which a trader borrowed US$10.00 million via a peer-to-peer DeFi lending app – a technique commonly used by cryptocurrency day traders to magnify gains – to buy ANA tokens. This drove the price up, and the trader used the higher price of ANA to obtain US$3.50 million worth of USDT held by NIRV at a discounted price. With the backing reserves drained, the value of both ANA and NIRV fell precipitously.[22]

In short, Stablecoins are vulnerable to collapse – or at least a particular variety of Stablecoin is. Terra, NIRV and aUSD are all so-called "algorithmic" Stablecoins which rely on arbitrageurs to realign prices and lack credible reserves to back them.



21 See page 32 below

22 See https://forums.solana.com/t/nirv-how-it-works/7603

How algorithmic Stablecoins work

Algorithmic Stablecoins were inspired by a 2014 paper published by Robert Sams[23] which addressed a problem evident from the outset in the performance of Bitcoin: because the supply of Bitcoin only ever increases (at least to the 21 million Bitcoin ceiling set at the outset), rises and falls in demand for Bitcoin must be accommodated by fluctuations in price, creating a volatility that renders Bitcoin useless as a medium of payment.

The solution proposed by Sams was to adjust the supply of a cryptocurrency to the demand for it. If the price of a cryptocurrency rises in response to buyers, its supply should be increased; if the price of a cryptocurrency declines in response to sellers, its supply should be reduced. It amounts to a practical application of the quantity theory of money: that the supply of money dictates the price level.[24]

The Sams model proposes that the same cryptocurrency be issued in two forms: coins and shares. When coin supply needs to increase, coins are exchanged for shares, which are then destroyed (coin supply increases and share supply decreases). When coin supply needs to decrease, shares are exchanged for coins, which are then destroyed (coin supply decreases and share supply increases).

The appeal of this mechanism to the cryptocurrency community is obvious. First, stabilisation of the value of the coin is fully decentralised: there is no need for a central bank to regulate the supply of "money" by buying and selling assets.

Secondly, the workings of the mechanism can be coded: the rules by which cryptocurrency is produced and destroyed can be written into the blockchain protocol as a series of automated auctions triggered by price movements against the currency peg. Terra (see Box) adhered closely to the Sams model.

An important question for the Sams model is why investors are incentivised to hold either the coins or the shares. The answer is that the coins might become useable as money (that is to say, a medium of payment, a store of value and a unit of account) and the shares are therefore a claim on the future supply of a coin that might become one of a small number of useable forms of digital money or even the unique form of useable digital money.

The fulfilment of such expectations is what would mark a truly successful algorithmic Stablecoin. Any Stablecoin that can be used as payment in everyday transactions would enjoy a degree of confidence comparable to major fiat currencies – which, not entirely unlike algorithmic Stablecoins, are backed by nothing more tangible than promises from governments, usually with long track records of inflation. So holding Terra and LUNA was a gamble on success, but one not without justification.

Terra: Terra was a classic instance of a Robert Sams "seigniorage share"[25]-style Stablecoin. When the price of Terra fell below its peg to the US dollar – Terra offered Stablecoins pegged not only to the US dollar but to the South Korean won, the Mongolian tugrik, and the IMF's Special Drawing Rights basket of currencies, but the US dollar was the peg that mattered - the protocol enabled holders to exchange Terra USD coins for newly minted LUNA shares at a fixed rate of US$1.00. This locked in a profit equal to the difference between the lower market value of the burned Terra coins (say, US$0.98) and the US$1.00 value of the newly minted LUNA. When the price of Terra USD rose above its currency peg, the opposite happened: holders of LUNA exchanged them for Terra USD coins at the US$1.00 rate, which was by definition below the prevailing market price of Terra. In theory, these reciprocal exchanges kept Terra close to its currency peg by adjusting the supply of the Stablecoin to the demand for it automatically. The Stablecoin achieved wide currency because LUNA was a native token issued on to a public blockchain of the same name that could support popular DeFi applications such as Chai (a mobile payments app available in South Korea that used Terra Stablecoins as the payment medium between consumers and merchants) and Anchor (a collateralised lending and borrowing protocol that offered a yield on Terra Stablecoin deposits). In fact, the Terra failure began when investors lost confidence in the ability of the Anchor protocol to sustain the payment of deposit rates of up to 19½ per cent at a time when deposits were increasing faster than loans and the lending rates on loans were lower than the interest rate on deposits. An increase in US dollar interest rates (the Fed Funds rate climbed sharply in the Spring of 2022) prompted withdrawals of Terra from Anchor over the weekend of 7 May. Redemptions of the Terra Stablecoin pushed it below its US$1.00 peg on 9 May 2022, prompting arbitrageurs to do what they were meant to do: exchange the discounted Stablecoin for US$1.00 of LUNA, the expectation being that this would drive the price of the Terra Stablecoin back to US$1.00. But so many Terra Stablecoins were being exchanged that the quantity of LUNA tokens being minted increased exponentially, making it impossible for them to maintain their value, eventually driving the value of LUNA down to zero in a so-called "death spiral." In fact, redemptions were occurring so fast and on such a scale that the Terra systems were unable to process the volume of transactions fast enough, further knocking confidence. Once LUNA fell to zero, Terra was effectively unbacked, and it could not raise fresh funds from issuing LUNA tokens. In other words, far from the loss of confidence in the Terra Stablecoin boosting the value of LUNA tokens, the loss of confidence in Terra led to a loss of confidence in LUNA, which had no inherent or intrinsic value. As soon as the market value of LUNA fell below the value of the Terra Stablecoin in issue, it precipitated the "death spiral" that saw a Stablecoin capitalised at US$18.6 billion on 8 May 2022 collapse completely, continuing to fall even when the issuer used Bitcoin reserves to buy Terra Stablecoins (an action that, ironically, had more effect in depressing the price of Bitcoin than shoring up Terra).[26]

23 Robert Sams, A Note on Cryptocurrency Stabilisation: Seigniorage Shares, first published 24 October 2014; version accessed published on 28 April 2015. It can be found at https://github.com/rmsams/stablecoins/blob/master/paper.pdf

24 The creators of the FRAX Stablecoin have expressed this ambition perfectly: "The end goal of the Frax protocol is to provide a highly scalable, decentralised, algorithmic money in place of fixed-supply digital assets like BTC." See https://coinmarketcap.com/currencies/frax/

25 (" They are called "seigniorage" Stablecoins because, in the estimation of their designers, the mechanism works in a way similar to the issue of fiat currency to commercial banks by central banks, which collect the profits from issuing physical notes and coins at face values far above their intrinsic values. In 2020, for example, the Bank of England generated seigniorage income of £555 million from its investment of the net proceeds of note and coin issuance. See Bank of England, Annual Report and Accounts 1 March 2020 to 28 February 2021, page 35)

26 "The SEC has since levelled charges the founders of Terra. See page [53]." Should appear at the end of the final line after "more effect in depressing the price of Bitcoin than shoring up Terra)."

Why algorithmic stabilisation mechanisms fail

The difficulty is how to survive the long period which might elapse between issue and success. Without everyday usage as money, any algorithmic Stablecoin is dependent on the fragile "confidence" of a small class of believers ranged against an even smaller class of professional traders comfortable with leveraged positions and short-selling techniques. What happens when these two forces collide is well illustrated by the demise of the NIRV Stablecoin (see Box above).

As the NIRV case illustrates, the principal challenge for the Sams seigniorage share model lies in maintaining market confidence that the algorithmic operations of the Stablecoin will continue to hold the trading price of the share/token around the designated peg. That confidence rests upon arbitrageurs behaving as they are supposed to.

And they are supposed to step into price declines to buy and price rises to sell, profiting from short-term fluctuations, but creating a beneficial side-effect in returning the Stablecoin to its peg. It is a self-referring (or "endogenous") system, both in the sense that the value of the token backing the Stablecoin depends on the stability of the Stablecoin itself, and in the sense that the confidence of arbitrageurs that a Stablecoin will return to its peg depends on the actions of the arbitrageurs themselves (whose primary goal is profit, not the peg).

Theoretically, the system is robust. As Adam Smith taught posterity, public benefits flow from private vices. And the case for arbitrageurs has long rested on the conviction that the public benefit they bestow is to bring prices back into alignment. In practice, however, these twin theories provide a fragile foundation for confidence in markets of limited size and scale.

Where they are not used for payments, algorithmic Stablecoins do not rest upon deep and active markets which supply a reliable pool of buyers. In any case where confidence is damaged, attempts to move the price back upward towards the peg by selling shares for coins are almost certain to fail, because every holder becomes a seller and buyers simply do not appear.

In other words, the arbitrage opportunity on which the Sams seigniorage shares model depends is turning out to be a one-way bet. Experience has shown that sellers of coins can break the peg, and even drive it down to zero, while holders of the tokens/shares have shown no appetite to keep buying when they know they cannot profit until the peg is restored.

This is, essentially, what happened to the IRON Stablecoin in June 2021. A malign interaction between the shares and the coins undermined the confidence ofinvestors, sparking a self-reinforcing wave of selling that eventually overwhelmed a well-designed stabilisation mechanism. The issuer, Iron Finance, (rightly) described the event as akin to a bank "run" (see Box).

Afterwards, one of the major backers of the IRON coin, the investor Mark Cuban, called for regulators to "define what a Stablecoin is and what collateralisation is acceptable."[27] It was a signal that even the most audacious innovators now recognised that Stablecoin technical developments were running ahead of the ability of arbitrageurs to protect investors. Perhaps regulators could help.

IRON: In June 2021 the IRON Stablecoin succumbed to what its issuer Iron Finance described as "the world's first large-scale crypto bank run." The reference was not misplaced. IRON was a partially collateralised Stablecoin which, not unlike a fractional reserve bank, lacked the reserves to repay all its holders at once. What prompted the "run" was the failure of the stabilisation mechanism IRON Finance had put in place to keep the price of IRON at or around US$1.00. One IRON coin was redeemable for US$1.00 of collateral. This in principle provided arbitrageurs with the opportunity to profit from exchanging IRON coins for collateral at US$1.00 when the price of IRON rose above US$1.00, and exchange collateral for IRON Coins, again at US$1.00, when the price of IRON fell below US$1.00. By the time the "run" occurred, the collateral backing the IRON Stablecoin was made up of a combination of shares in a DeFi liquidity provider token called TITAN (25 per cent) and the Circle-Coinbase Stablecoin USDC (75 per cent). It was a sudden rise and fall in the price of TITAN that caused the IRON Stablecoin to lose its US$1.00 peg. When the TITAN price surged, holders sold it for IRON coins, as expected. Predictably, the TITAN price fell, reducing the value of 25 per cent of the collateral underpinning the IRON coin. Equally predictably, the IRON coin fell below US$1.00 – but sharply, to US$0.70. Holders of the IRON coin panicked, exchanged IRON for TITAN, and sold it. This made the problem worse, not only because TITAN was being sold but because IRON coin redemptions were increasing the supply of TITAN. Transactions were occurring at such speed and scale that the stabilisation mechanism itself broke down: the TITAN spot price fell so fast that the Trade Weighted Average Price (TWAP) oracle that determined the price of TITAN redemptions after a ten-minute delay made normal arbitrage trades unprofitable – in effect, breaking the stabilisation mechanism. The price of TITAN hit zero, driving the IRON coin far from its US$1.00 peg. Investors lost an estimated US$2 billion.

27 Coin Telegraph, "Mark Cuban calls for Stablecoin regulation in wake of Iron Finance 'bank run'," 18 June 2021.

Why regulators are content to ignore algorithmic Stablecoins

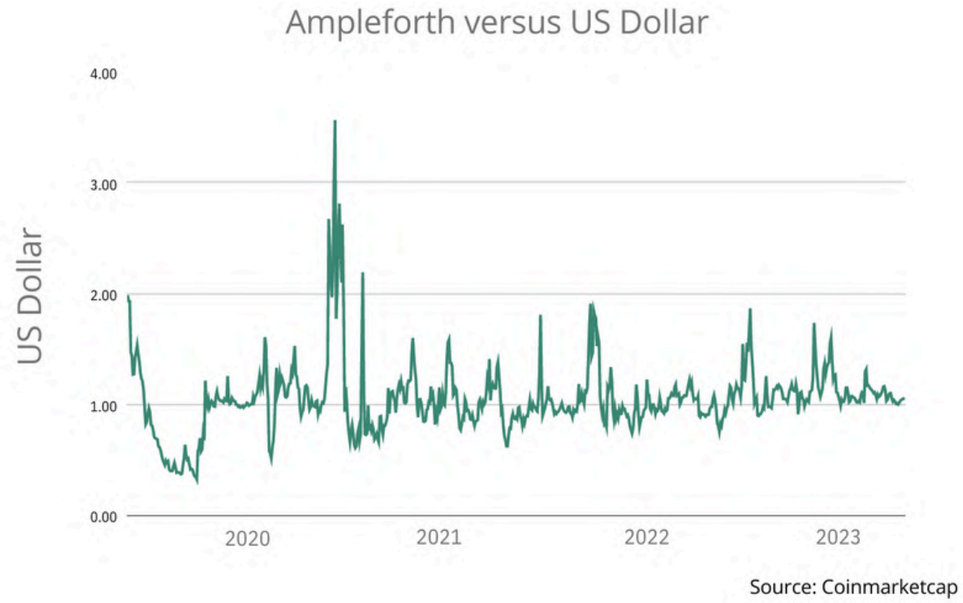
By the summer of 2021, regulators were certainly interested in Stablecoins, but not in algorithmic Stablecoins. As early as October 2019, in a seminal report sparked by the prospect of Facebook launching a Stablecoin called Libra, the Group of Seven (G7) Working Group on Stablecoins placed algorithmic Stablecoins "outside the scope of this report, as their ability to maintain a stable value over the medium term is questionable."[28]

This turned out to be a sound judgment. Recent experience suggests that even if the cryptocurrency and DeFi markets were deeper and could produce buyers as well as sellers at moments of crisis, only the most credulous will believe that algorithmic Stablecoins can do what they are supposed to do: provide users with a predictable means of value transfer by maintaining their peg.

Even those algorithmic Stablecoins that have not succumbed to a Terra or NIRV or IRON "death spiral" are not effective in maintaining pegs. For example, the asset-backed Tether Stablecoin (USDT) is able to trade for long periods close to its US$1.00 peg, experiencing sharp divergences only at times of wider market stress such as the collapse of Terra (May 2022) or FTX (November 2022) or the failure of Silicon Valley Bank (March 2023). The algorithmically governed, US dollar-pegged Stablecoin Ampleforth (AMPL), by contrast, fluctuates constantly (see Chart).

Since its launch in 2019, the value of AMPL against the US dollar has risen as high as US$3.83 and fallen as low as US$0.32 – a trough-to-peak gap of more than 1,000 per cent. But its entire history illustrates the difficulty that even a well-designed algorithmic Stablecoin – holders own a fixed proportion of the total supply of Ampleforth, which remains unchanged as the quantity rises and falls - has in maintaining stability.

Innovation itself has become part of the problem, as a limited herd of investors with equally limited resources have a disproportionate influence on the price of a



Source: Coinmarketcap

thinly held and traded asset as they switch almost mindlessly from one flavour-of-the-month Stablecoin to another. This is tainting the entire genre of algorithmic Stablecoins. As volatility and collapses have damaged some algorithmic Stablecoins, so they have undermined all of them by destroying the confidence of holders of any algorithmic Stablecoin that the one they own will not be next in line for disaster.

Unsurprisingly, the judgment of the G7 in October 2019 – that the future of Stablecoins does not lie with the algorithmic variety – is now the consensus view. As the FSB put it in October 2022: "A GSC [Global Stablecoin] should not rely on arbitrage activities to maintain a stable value at all times and it should not derive its value from algorithms."[29]

There is no need for regulators to ban algorithmic Stablecoins, as some have proposed and others have feared; they are already irrelevant to the future of Stablecoins, if not of cryptocurrencies.[30] Regulators are focusing their attention on simpler Stablecoins that are more easily understood but which might yet pose issues of systemic risk or investor protection: the asset-backed variety.

28 G7 Working Group on Stablecoins, Investigating the impact of global stablecoins, October 2019, page 24.

29 Financial Stability Board, Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022, page 20.

30 Regulators in the United Kingdom, for example, do not intend to ban algorithmic Stablecoins. Instead, they will be regulated in the same way as unbacked cryptocurrencies such as Bitcoin, and face comparable marketing restrictions. See HM Treasury, Future financial services regulatory regime for cryptoassets: Consultation and call for evidence, February 2023, paragraph 4.25, page 32.

Stablecoins backed by cash and money market instruments

The majority of Stablecoins, by number and value, are asset-backed.[31] They come in two varieties. Although some analysts list commodity-backed coins or tokens as asset-backed Stablecoins – of which the Paxos Gold Coin and the Digix Gold Token are the best-known – such instruments are better understood not as Stablecoins but as devices to make precious metals and other physical assets more investable by tokenising holdings of the underlying assets.

A genuinely asset-backed class of Stablecoin must be one backed by holdings of fiat currency or short-dated fiat currency assets. In an innocent world, each US$1.00 of Stablecoin would be backed by US$1.00 on deposit at a creditworthy bank independent of the issuer. But, apart from the cost disincentive of holding cash rather than more remunerative investments,[32] this would make a Stablecoin indistinguishable from electronic money ("e-money"), which has proven disadvantages.

In the United Kingdom, for example, regulations of 2011 insist that issuers of e-money safeguard investors' cash by placing it in a segregated account separate from in-house funds; or invest it in secure, low-risk, liquid assets approved by the regulator and held by third-party custodian banks; or secure an insurance policy or bank guarantee against loss.[33]

One Stablecoin – the Isle of Man-based and Isle of Man-regulated Sterling poundtoken (GBPT) – has elected to operate within this constraint.[34] The assets backing the coin consist solely of fiat currency cash deposits held in a segregated account which cannot be reinvested or lent or borrowed. The issuer and the third-party bank are rewarded solely via the interest paid on the deposits.

Rising interest rates have made cash deposit-only backing more viable but it remains an unattractive business for banks since they cannot profit from on-lending the cash in the same way as ordinary bank deposits, as the history of e-money shows: e-money remains a relatively small market.[35]

Deposit-backed instruments have been issued by banks but they are better understood as tokenised deposits than as Stablecoins and are issued by banks primarily to create internal efficiencies for existing clients.[36] Deposits remain unattractive to issuers of genuine asset-backed Stablecoins for the same reason e-money is unattractive to banks.

Banks that hold cash or money market instruments on behalf of Stablecoin issuers are also acting not as bankers capable of turning cash into credit by lending it to other customers but as custodians of client assets, for which they are rewarded by a share of interest income.

This is a role akin to that of the depository bank in the European Union (EU) regulations governing mutual funds – the Undertakings for Collective Investment in Transferable Securities (UCITS) Directive - in which an independent custodian bank is responsible for making customers whole in the event of loss. As custodians, banks nevertheless incur risk. Some of the risk is operational. For example, issuing and redeeming asset-backed Stablecoins requires the custodian to receive and authenticate instructions from multiple blockchain networks on which a Stablecoin might be used.

31 https://www.theblock.co/data/decentralized-finance/stablecoins

32 Rising interest rates have made the discount for holding cash less steep.

33 Statutory Instrument 2011 No. 99, Financial Services and Markets, The Electronic Money Regulations (EMR), made 18 January 2011. These regulations define e-money as electronically stored monetary value that represents a claim on the issuer; is issued on receipt of funds for the purpose of making payment transactions; is accepted by a person other than the issuer; and is not excluded by the EMR from the definition of e-money.

34 See blackfridge, pountoken.io GBPT Whitepaper, March 2022, paragraph 72,page 15.

35 In June 2021 the Bank of England estimated that there was only €9.7 billion of e-money funds in issue in the United Kingdom. See Bank of England, New forms of digital money, June 2021, page 21.

36 See the discussion of the JPM, USDF and other bank-issued coins on pages 109-110 below.

These networks have different technical requirements and varying degrees of physical and software security.

The risks created by banks are also physical (if the custodian systems fail or are destroyed) and criminal (the custodian might fall victim to hackers or fraudsters). Yet custodians must run these risks without any compensating returns other than a portion of the interest income.

Even if a Stablecoin is 100 per cent cash-reserved, a "run" in which holders redeem en masse and the issuer has to pay out cash rapidly, is still a possibility. It could potentially have knock-on effects beyond the independent custodian banks holding the cash.

If a custodian bank failed, or looked like failing, that would in turn impact other banks through the inter-connectedness of the banking system.[37] But in terms of risk management, paying out cash from a segregated deposit account at a custodian bank is still preferable to a fire-sale of money-market assets to generate the cash to meet redemptions, which is the principal risk most asset-backed Stablecoin issuers incur.

37 Holding cash reserves at a bank exposes holders of Stablecoins to losses if the bank fails, as Stablecoin issuers found when a number of banks failed in March 2023 (see pages 48-49). The risk is mitigated by diversification, segregation of the assets and (up to agreed ceilings) any deposit insurance schemes to which the custodian bank belongs. For a discussion of these issues, see Bank of England, New forms of digital money, June 2021, page 88.

Interview with Gilbert Verdian, CEO of Quant

Stablecoins are part of something big that is happening to money

Regulators have a clear strategy on Stablecoins. It is to reduce their destabilising influence and embrace the innovation they represent by bringing Stablecoins within the perimeter of the regulated banking industry. Stablecoins, like CBDCs, are among the first steps in a structural shift towards tokenised programmable money that will deliver the choice, competition and innovation regulators want to encourage. The shift will deliver savings for banks and their clients in both liquidity and transactions costs that are impossible to achieve with existing technologies. Yet Stablecoins are a less radical break with the status quo in the form and uses of money than many tokenisation enthusiasts claim. Gilbert Verdian, CEO of Quant, explained to Dominic Hobson, co-founder of Future of Finance, why Stablecoins are best judged in the broader context of tokenised, programmable money as a whole.

Hobson: Emerging Stablecoin regulations clearly favour banks over non-banks. How do you interpret that?

Verdian: Regulators in different jurisdictions are accelerating their efforts to regulate the sector in the wake of the FTX, Voyager, Celsius and Terra/LUNA debacles. But it is not just reactive. Regulators are readying the established financial system for the introduction of new forms of

money, including Central Bank Digital Currencies (CBDCs) and tokenised, programmable commercial bank money. They want the new system to be underpinned by regulated, insured institutions that can protect consumers and the integrity and stability of the system.

Hobson: So far, banks have issued mainly tokenised deposits rather than asset-backed Stablecoins. What does that tell us?

Verdian: It tells us that that both regulators and banks expect the financial markets to transition towards tokenised forms of commercial bank money on the foundation of CBDCs. Tokenised deposits are superior to asset-backed Stablecoins issued by non-banks against reserves that lack a fully transparent audit trail in every sense save open distribution, since they are backed by cash liabilities of regulated, audited issuers. As a trustworthy form of cash, they are a precursor to the tokenised, programmable forms of money based on CBDC reserves held by commercial banks at the central banks that we will see in the future. Clearly, these new forms of money cannot be successful if they are confined to clients of individual banks. They need to be linked, and to become inter-operable in a fully compliant way, to provide the unobstructed domestic and international networks consumers and businesses need to make payments and investments using different forms of tokenised, programmable money without running into operational obstacles. Tokenised deposits are a starting point that provide banks and regulators with a controlled space in which banks can ensure they are aligned with regulatory intent and regulators can ensure they get the balance between safety and innovation right.

Hobson: What are the incentives for banks to issue Stablecoins or tokenised deposits?

Verdian: Banks are under constant pressure to ensure sufficient funds are available at reasonable cost to meet the demands of both lenders and borrowers. By facilitating transfers of funds within a bank, and between banks, and between banks and other funding counterparties, new forms of money such as tokenisation of otherwise idle deposits and the use of assets to back the issuance of Stablecoins can free up liquidity. That liquidity allows banks to do more business with clients. Since they are generally backed by assets eligible at a central bank, the Stablecoins held by banks can in principle also be used to access central bank liquidity intra-day or overnight. On the retail side of their business, programmable money moves the service capabilities of banks beyond the binary choices – namely, buy or sell and push or pull – imposed by the limitations of current forms of money. For example, programmable money can make payment conditional on fulfilment of a contract being verified by a bank. By eliminating counterparty credit risk and reducing transactions costs by dispensing with the need for multiple checks and reconciliations by intermediaries, conditional payment services will likely increase commerce and investment and so add to economic growth. Incidentally, because transactions are captured on a blockchain ledger, tokenised money also gives banks and central banks better insight into the uses and velocity of money.

Hobson: If banks must all comply with regulations, what scope will they have to differentiate themselves as issuers of tokenised money?

Verdian: Every bank must meet the regulatory requirements. Where they will differentiate themselves is through the products and services they develop using programmable money. Banks can, for example, specialise in the provision of verification services to automate the settlement of invoices, or the settlement of cross-currency payments, or even in conditional payment services within families. Banks will use programmable money to offer new products and services that suit the markets they serve but that do not exist today.

Hobson: That implies that consumers and businesses will use different forms of money from different banks for different purposes. How big a change is that?

Verdian: Using different banks for different purposes is no different from how customers have used banks and payments systems for years. They have multiple bank accounts and multiple physical cards and apps, and have long since ceased to tolerate the inconvenience, costs and delays of non-digital intermediation. What programmable money will do is greatly increase the range of choice that customers have, because programmability forces the banking industry to create the right products for the consumers and businesses they serve. Over time, programmability will increase the number of banking services consumers and businesses use and increase the pace of innovation in the savings as well as the payment services offered by banks.

Hobson: If banks become the favoured issuers of tokenised money in the eyes of regulators, what do you predict for the non-bank issuers of Stablecoins that dominate the market today?

Verdian: We have seen regulators, especially in the United States, adopt a more aggressive approach to non-bank Stablecoin issuers. Consumers and businesses that use Stablecoins, and especially institutional users, will migrate to alternatives that are more likely to keep their assets securely, more likely to make them whole in the event of loss and which are not just safer from regulatory attack but bolstered by a culture of regulatory compliance. That means commercial bank Stablecoins, tokenised deposits and CBDCs.

Hobson: If we have multiple forms of commercial bank money in circulation, how can we avoid 19th century-style balkanisation of the financial markets?

Verdian: Migration to multiple forms of programmable money does not mean there will be dozens of different versions of every major

currency. Every version of a particular currency denomination will be exchangeable for every other version of that denomination and ultimately redeemable for the CBDC version of that denomination. Regulators will not permit banks to issue monies useable only in their ATMs or their point-of-sale systems or with their clients only. In fact, one of the exciting things about programmable money is that it will be fully exchangeable not only with other forms of money in the domestic market but will also facilitate bank-to-bank transactions across national borders and national currencies.

Hobson: Although there is a global consensus on how to regulate Stablecoins, is there a risk that local variations will create opportunities for regulatory arbitrage?

Verdian: Each country will follow the global consensus in terms of the essential and important components such as investor protection and asset disclosure and segregation but adapt it to what is workable in their jurisdiction while also maintaining a respectable profile in the global marketplace. That precludes Stablecoin issuers backing their issues with lower quality collateral, for example. As the history of Open Banking shows, a global consensus with local variations can lead to a lot of innovation and incentive to invest without creating opportunities for regulatory arbitrage. The same will be true of programmable money.

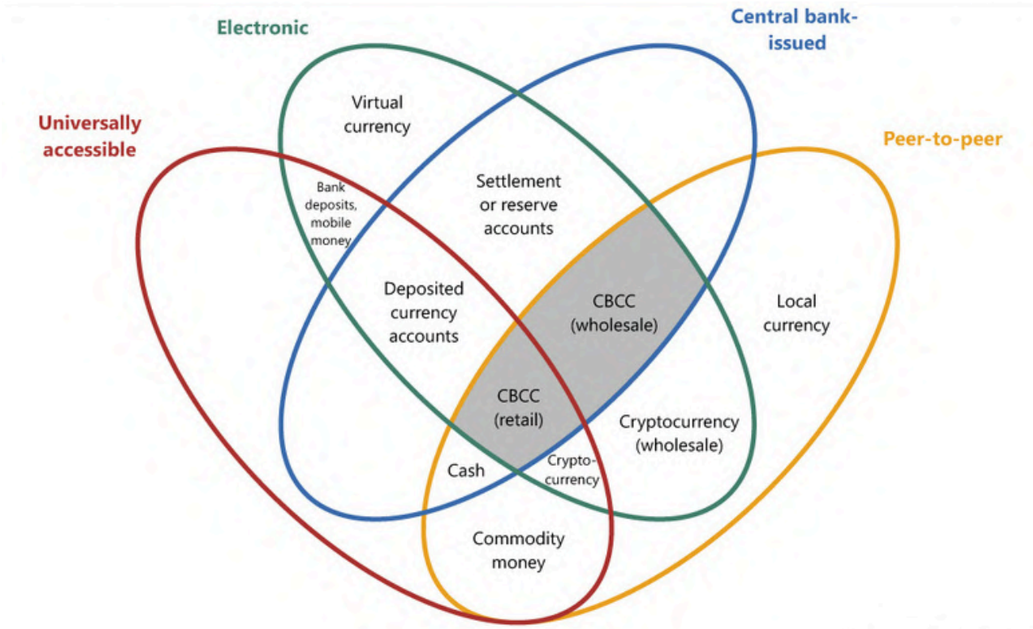
Hobson: What first alerted regulators to Stablecoins back in 2019 was the threat of a non-bank (then Facebook, now Meta) launching a global Stablecoin. Are they still motivated by that concern?

Verdian: The main concern of regulators is systemic risk. Until recently, the cryptocurrency and DeFi markets were seen by regulators as too small to create systemic risk. Events such as FTX, Celsius and Voyager are the Lehman moments that have changed that view. So regulators are now looking to stabilise and regulate the markets, but that is not all they are doing. They are also looking to legitimise the innovations and the technology so they can be used by regulated institutions. They are not banning the new forms of money but embedding the features of programmable money in the existing system.

Hobson: Stablecoins will always be pegged to a particular currency or basket of currencies. Will the availability of those currencies in the form of CBDCs make any difference to that relationship?

Verdian: The "money flower" Venn diagram used by the Bank for International Settlements (BIS) in their original paper on CBDCs of March 2018 showed that the different features and functions of the various forms of money mean all have their place in a single system. Central bank money lies at the centre of the "flower" but it does not compete with the other forms of money. Different monies, and different payments methods, are used for different purposes, but together they provide the services that consumers and businesses need to satisfy a range of use-cases. Neither CBDCs nor tokenised, programmable commercial bank monies such as Stablecoins will change that basic paradigm. Instead, the various components of the "flower" will adapt to meet the changing needs of consumers and businesses. Though discussions about Stablecoins and CBDCs makes it seem as if tokenised, programmable money is supply-driven, it is not. Money is always a demand-led phenomenon, and tokenised, programmable money is not an exception.

The Money Flower: A taxonomy of money



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How asset-backed Stablecoin issuers invest their reserves

Stablecoin issuers incur that risk because depositing cash subscriptions at an independent custodian is generally not profitable enough. Of the assets backing the Tether USDT Stablecoin, for example, less than one dollar in twelve is held in the form of cash deposits (see Table).

More than two thirds of the assets backing USDT are held in the form of money market instruments, consisting mostly of government bills but also – perhaps worryingly, given their history - money market funds. The need to balance returns against risks is a constant demand for Stablecoin issuers.

As the Table shows, Tether used to invest in commercial paper, a form of short-term corporate debt, as well as government bills. However, on 13 October 2022 Tether announced that it had eliminated commercial paper from its reserves and replaced the holdings with US Treasury Bills, on grounds they are more secure.[38]

38 The need to find yield-producing investments inevitably increases risk, which can be exacerbated by the legal uncertainty surrounding cryptocurrencies. After the cryptocurrency lender Celsius Network filed for bankruptcy in July 2022, for example, Tether responded to media speculation about how it had recovered a loan to the failed enterprise. The company explained that the loan was over-collateralised by Bitcoin (to 130 per cent of the value of the loan) which it sold to cover its exposure, and then returned the remaining surplus to Celsius: https://tether.to/en/tether-discloses-celsius-loan-liquidation-process/. This sparked further speculation about whether the legal status of digital assets enabled Tether to perfect its title to the collateral or whether the liquidators of Celsius Network could lay claim to the assets for the benefit of other creditors. See, for example, Financial Times, "Tether's recovery of an $840mn loan scrutinised in Celsius bankruptcy," 26 July 2022. The treatment of collateral in cases of failure has been an issue in bankruptcies in conventional markets and is likely to remain one in digital asset markets, especially when multiple jurisdictions are involved.

Consolidated Reserves of the USDT Stablecoin

Asset Category	Amount in US$ (30 June 2022)	Percentage of the whole	Amount in US$ (30 September 2022)	Percentage of the whole	Amount in US$ (31 December 2022)	Percentage of the whole
1. Cash & Cash Equivalent & Other Short-Term Deposits &Commercial Paper						
U.S. Treasury Bills with an average maturity of less than 60 days	28,856,434,491	43.45%	$39,678,465,980	58.30%	$39,230,259,046	58.51%
Commercial Paper and Certificates of Deposit[39] (average duration of 27 days; average rating A-1)	8,402,426,505	12.65%	$49,981,855	0.07%	$-	0.00%
Money Market Funds (invested in deposits, commercial paper, treasury bills, reverse repo)	6,810,253,431	10.25%	$7,101,935,591	10.43%	$7,372,926,391	11.00%
Cash & Bank Deposits (call and term deposits)	5,418,232,067	8.16%	$6,077,722,223	8.93%	$5,318,311,794	7.93%
Reverse Repurchase Agreements (issuers' minimum rating is A-2)	2,992,015,954	4.51%	$3,023,814,393	4.44%	$3,046,093,954	4.54%
Non-U.S. Treasury Bills (average maturity of less than 90 days)	397,150,678	0.60%	$182,114,357	0.27%	$93,849,833	0.14%
Subtotal	**52,876,513,126**	**79.62%**	**$56,114,034,399**	**82.45%**	**$55,061,441,018**	**82.13%**
2. Corporate Bonds, Funds & Precious Metals	3,486,896,735	5.25%	$3,194,369,894	4.69%	$3,444,097,599	5.14%
3. Other Investments (includes digital tokens)	5,551,836,303	8.36%	$2,617,267,750	3.85%	$2,685,786,230	4.01%
4. Secured Loans (none to affiliated entities)	4,494,373,260	6.77%	$6,135,946,415	9.02%	$5,852,823,328	8.73%
Subtotal	**13,533,106,298**	**20.38%**	**$11,947,584,059**	**17.55%**	**$11,982,707,157**	**17.87%**
Total (1+2+3+4)	**66,409,619,424**	**100.00%**	**68,061,618,458**	**100.00%**	**$67,044,148,175**	**100.00%**

Source: Tether Holdings Limited, Consolidated Reserves Reports as of 30 June, 30 September and 31 December 2022.

39 Tether announced on 13 October 2022 that it had eliminated commercial paper from its reserves and replaced the holdings with UD Treasury Bills, on grounds they are more secure.

The next largest Stablecoin – USDC, issued by Coinbase and Circle – has a simpler set of reserves (see Table), consisting of US government treasury bills invested via a single money market fund (following a decision in the autumn of 2022 to shift reserves into a dedicated und run by the asset manager BlackRock) and deposits at seven regulated banks in the United States.[40]

Unfortunately, those banks included Silicon Valley Bank (which failed), Signature Bank (which was closed by the New York State Department of Financial Services NYDFS and the Federal Deposit Insurance Corporation (FDIC) and Silvergate Bank (which opted for a voluntary liquidation), all of which got into difficulties in March 2023 during the long aftermath of the failure of the FTX cryptocurrency exchange in November 2022. Most of the cash reserves were not covered by the FDIC insurance scheme. Over the weekend, multiple Stablecoins experienced de-pegging due to worries about the adequacy and liquidity of their reserves following the failure of Silicon Valley Bank.

Consolidated Reserves of the USDC Stablecoin

Asset Category	Amount in US$ (31 December 2022)	Percentage of the whole	Amount in US$ (31 January 2023)	Percentage of the whole	Amount in US$ (28 February 2023)	Percentage of the whole
1. Circle Reserve Fund						
US Treasury Securities	23,581,809,113	52.76%	33,723,644,221	79.66%	31,677,326,857	74.61%
Cash deposits	48,991,340	0.11%	54,742,853	0.13%	302,341,595	0.71%
Net cash due	33,056,600	0.07%	-116,203,278	-0.27%	-113,655,068	-0.27%
Sub-total	**23,663,857,053**	**52.95%**	**33,662,183,796**	**79.51%**	**31,866,013,384**	**75.06%**
2. Other USDC Reserve Assets						
US Treasury Securities	10,523,715,583	23.55%	-	-	-	-
Cash deposits	10,526,235,601	23.55%	8,700,672,117	20.55%	10,626,132,587	25.03%
Net cash due	-19,844,536	-0.04%	-27,121,839	-0.06%	-35,728,546	-0.08%
Sub-total	**21,030,106,648**	**47.05%**	**8,673,550,278**	**20.49%**	**10,590,404,041**	**24.94%**
Total	**44,693,963,701**	**100.00%**	**42,335,734,074**	**100.00%**	**42,456,417,425**	**100.00%**

Source: Circle Internet Financial, LLC, Attestation Reports, 31 December 2022, 31 January 2023 and 28 February 2023

The banking crisis affected all three of the largest non-bank, asset-backed Stablecoins. USDT, whose banking relationships are less visible, spiked upwards to nearly US$1.03. Within a narrow range, BUSD dipped (to US$0.9956) and spiked (to US$1.0095) and then dipped again (to US$0.9934). But USDC was worst hit, falling to a low of US$0.901 on news of its exposure to the failed banks. However, USDC recovered its peg quickly once the FDIC intervened and extended deposit guarantees to all depositors.

To halt the "run" on issuers, and the underlying assets issuers were liquidating, the FDIC had little choice but to act, not least because it was the cautious regulatory attitudes of tier one commercial banks that forced Stablecoin issuers to concentrate their deposits with second and third tier banks.

Although the Office of the Comptroller of the Currency (OCC) permitted national banks – those that have reserve accounts with the Federal Reserve and participate in the deposit insurance scheme – to accept deposits from Stablecoin issuers as long ago as 2020,[41] commercial banks inside and outside the United States were circumspect about establishing relationships with Stablecoin issuers. This concern stemmed partly from anxiety about the financial integrity of some Stablecoin issuers, following measures taken by regulators against Tether. In 2021, the Commodity Futures Trading Commission (CFTC) had fined Tether US$41 million for "making untrue or misleading statements and omissions of material fact in connection with the U.S. dollar tether token (USDT) Stablecoin." In a press release, the CFTC explained:

Since its launch in 2014, Tether has represented that the Tether token is a Stablecoin with its value pegged to fiat currency and 100 per cent backed by corresponding fiat assets, including U.S. dollars and euros. However, the Tether order finds that from at least June 1, 2016 to February 25, 2019, Tether misrepresented to customers and the market that Tether maintained sufficient U.S. dollar reserves to back every USDT in circulation with the "equivalent amount of corresponding fiat currency" held by Tether and "safely deposited" in Tether's bank accounts. In fact Tether reserves were not "fully-backed" the majority of the time. The order further finds that Tether failed to disclose that it included unsecured receivables and non-fiat assets in its reserves, and that Tether falsely represented that it would undergo routine, professional audits to demonstrate that it maintained "100 per cent reserves at all times" even though Tether reserves were not audited.[42]

40 The seven banks were Bank of New York Mellon, Citizens Trust Bank, Customers Bank, New York Community Bank, a division of Flagstar Bank, N.A., Signature Bank, Silicon Valley Bank and Silvergate Bank..

41 Office of the Comptroller of the Currency, Interpretive Letter #1172, October 2020, OCC Chief Counsel's Interpretation on National Bank and Federal Savings Association Authority to Hold Stablecoin Reserves, 21 September 2020.

42 Commodity Futures Trading Commission, CFTC Orders Tether and Bitfinex to Pay Fines Totalling US$42.5 Million, 15 October 2021.

The New York attorney general had earlier fined Tether and others US$18.5 million for misrepresenting the assets backing the Tether Stablecoin. Attorney General Letitia James said that "Tether's claims that its virtual currency was fully backed by U.S. dollars at all times was a lie."[43]

It was as part of the settlement of the legal intervention by the New York attorney general that Tether agreed to increase the visibility of the USDT reserves by publishing the categories of assets backing the Stablecoin every three months (it also agreed to cease trading with persons and entities in New York).

When the earliest disclosures showed that Tether was backed primarily by one-to-four-day commercial paper rather than cash or Treasury bills,[44] this generated criticism that nothing was known about the issuers of the funds, bonds or commercial paper or the banks at which cash was on deposit. That was what prompted USDT to steadily reduce its holdings of commercial paper to zero and replace them with US Treasury Bills.[45] The banks holding the cash, and the issuers of the money market funds used, are not yet disclosed, though the firm has used Deltec Bank & Trust and Capital Union Bank in the Bahamas.[46]

In June 2022 the NYDFS published guidelines on the nature of the reserve assets eligible to back Stablecoins, restricting them to US Treasury bills, reverse repo agreements collateralised with US Treasury debt, US government money market funds and cash deposits at US State or Federally chartered banks. The NYDFS also insisted Stablecoin issuers publish an audited account of the reserves broken down by asset class.[47] Though this advice did not affect USDT (which is not regulated by the NYDFS) it did oblige BUSD, whose reserves are managed by the NYDFS-regulated Paxos Trust, to move beyond a simple statement that the number of BUSD tokens in issue was covered by an equivalent amount of US dollars and US government debt instruments. Since August 2022, BUSD reserve account reports have included details of Treasury bills held, US government bonds held as collateral in repo transactions and not only the banks where cash is held but also those that are FDIC-insured (see Table).[48]

Paxos Trust uses

43 Letitia James, NY Attorney General, Attorney General James Ends Virtual Currency Trading Platform Bitfinex's Illegal Activities in New York, 23 February 2021. The attorney general concluded that a significant amount of Tether reserve assets was provided to its related cryptocurrency exchange (Bitfinex), which was suffering from a liquidity shortage, without proper disclosure (the loan would not have been allowed if Tether were a financially regulated entity). In February 2021, Bitfinex and Tether agreed to pay a fine, cease their services to New York residents and entities, and start providing quarterly transparency reports. The Commodity Futures Trading Commission also identified that Tether held sufficient fiat reserves for only 27.6 percent of the days in a 26-month sample period from 2016 through 2018 and imposed civil monetary penalties in October 2021.

44 Gary B. Gorton and Jeffery Y. Zhang, Taming Wildcat Stablecoins, 30 September 2021, page 8.

45 Tether, "Tether Slashes Commercial Paper to Zero," 13 October 2022.

46 Morgan Stanley, Who is Still Banking Crypto Companies?, research note, 4 April 2023, Exhibit 2, page 4.

47 Adrienne A. Harris, Superintendent of Financial Services, Industry Guidance to Entities Licensed Under 23 NYCRR Part 200 or Chartered as Limited Purpose Trust Companies Under the New York Banking Law That Issue U.S. Dollar-Backed Stablecoins Under the Supervision of the New York State Department of Financial Services (DFS), Guidance on the Issuance of U.S. Dollar-Backed Stablecoins, 8 June 2022.

Consolidated Reserves of the BUSD Stablecoin

	Amount in US$ (30 December 2022)	Percentage of the whole	Amount in US$ (31 January 2023)	Percentage of the whole	Amount in US$ (28 February 2023)	Percentage of the whole
US Treasury Bills	3,888,435,500	22.81%	3,344,117,500.00	20.36%	3,096,332,000.00	28.86%
US Treasury Securities held as collateral in repo transactions	12,576,600,064.00	73.77%	12,438,900,152.00	75.75%	6,945,769,673.00	64.74%
Cash deposits	582,836,893.00	3.42%	638,156,994.00	3.89%	687,340,268.00	6.41%
Total	**17,047,872,457.00**	**100.00%**	**16,421,174,646.00**	**100.00%**	**10,729,441,941.00**	**100.00%**

Source: Paxos Trust Company, LLC, Reserve Accounts Reports, USDP, 31 January and 28 February 2023

Consolidated Reserves of the USDP Stablecoin

	Amount in US$ (31 January 2023)	Percentage of the whole	Amount in US$ (28 February 2023)	Percentage of the whole
US Treasury Bills	249,536,500	25.44%	249,578,000.00	28.40%
US Treasury Securities held as collateral in repo transactions	397,800,074	40.55%	346,800,068.00	39.46%
Cash deposits	333,625,406	34.01%	282,473,880.00	32.14%
Total	**980,961,980**	**100.00%**	**878,851,948**	**100.00%**

Source: Paxos Trust Company, Reserve Accounts Report – BUSD Token, 30 December 2022, 31 January 2023 and 28 February 2023

48 At end-March 2023, Paxos Trust also held private uninsured deposit insurance in the amount of $61,717,559. See Paxos Binance USD (BUSD) Unaudited Holdings for March 31, 2023.

independent reciprocal deposit network managers (Intrafi and Reich & Tang) to disperse BUSD reserve deposits to multiple banks in lots that maximise FDIC insurance coverage, but the firm also uses well-known FDIC-insured banks such as BMO Harris Bank and State Street Bank and Trust Company. Paxos uses the same blend of services to hold the cash assets of its own much smaller Pax Dollar Stablecoin (see Table).[49]

The range of banks used reflects the fact that large and well-established commercial banks are generally reluctant to accept deposits from Stablecoin issuers, chiefly on regulatory grounds. In September 2022 the IMF explicitly warned such banks that "the involvement of large financial institutions in areas like [Stablecoin] reserve management, custody, and issuance has the potential to rapidly generate new risks."[50]

As a result, even those Stablecoin issuers that actively seek regulatory respectability were effectively forced to place reserves with a narrower cast of commercial banks. This perverse regulatory effect played a large part in creating the bank and reserve "runs" and concentration risks that erupted in March 2023.

The decision by the FDIC to intervene before the "runs" spiralled out of control proved that attempts to distinguish between important and unimportant banks makes no difference in a crisis. Indeed, the FDIC intervention resolved a hitherto theoretical debate among regulated banks and international regulators over whether the cash holdings of non-bank, asset-backed Stablecoins should be covered by deposit insurance at all.[51]

Established deposit-taking banks were understandably opposed to extending the benefits of insurance to Stablecoins, given that they and their customers would bear the burden of supporting failed Stablecoins through the premiums they pay to the FDIC.[52] By proving that, in extremis, regulators will always underwrite a banking system at risk from "runs," the FDIC has decided in favour of Stablecoin issuers.[53]

The obvious implication of treating Stablecoin issuers athe equivalent of banks is that they must be regulated as banks. This was already implicit in the work on Stablecoins that began in 2019, but gathered momentum as the Stablecoin industry grew.

In its October 2022 paper, published six months before the March 2023 crisis, the FSB argued for Stablecoins to face stricter requirements on their issuance, redemption and stabilisation functions, including capital buffers, to limit the credit and liquidity risks they represented:

The sudden loss of confidence in private sector issued commercial bank deposits, and in other private sector issued financial instruments that promise (implicitly or explicitly) to maintain a stable value with fiat currency, is a longstanding risk in the history of banking and finance. Runs can threaten the safety and soundness of individual banks but also lead to a more generalised loss of confidence in deposits and other liabilities of other banks. Such contagion can generate system-wide stress as evidenced by the 2007-09 financial crisis. Runs on other institutions can pose similar financial stability risks, such as the runs faced by money market funds in 2008 and 2020. Because Stablecoins engage in similar maturity transformation, they are similar in their susceptibility to a sudden loss in confidence and the risk of a run on the issuer or underlying assets.[54]

49 Paxos Pax Dollar (USDP), Unaudited Holdings for 31 March 2023, Note 1.

50 International Monetary Fund, FinTech Notes, Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements by Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto, Note/2022/008, September 2022, page 6.

51 An implication of the regulatory preference for banks as issuers of Stablecoins – see pages [52] to [61] below – is that Stablecoins issued by banks will be covered by deposit insurance. The President's Working Group (PWG) in the United States in its November 2021 report expressly acknowledged this. The Bank of England expects that Stablecoins issued as tokenised deposits by banks would also be covered by deposit insurance, while non-bank issuers will be covered by an insolvency regime.

52 See International Association of Deposit Insurers, Deposit Insurance in 2023, Global Trends and Key Issues, February 2023, which includes on page 21 the observation that "the FSB stresses that a Stablecoin issuer's failure to guarantee such redeemability could lead to `a run on the stablecoin,' which can "lead to a more generalised loss in confidence in deposits and other liabilities of other banks. Such reasoning seems to reflect the belief of analogy of fiat backed Stablecoins with bank deposits; with the subsequent implications for deposit insurance." See also Dr Andreas J. Zimmermann and Professor Dr Walter Farkas, Deposit Insurance for Digital Financial Products and Services: A worldwide overview of fintech offerings from a deposit insurance perspective to identify potential needs for policy design actions, November 2021, revised September 2022 by Lucas Metzger, which argues that Stablecoins should be regulated as exchange-traded funds and not as bank deposits.

53 Ironically, the FDIC had earlier had to take action to prohibit bogus claims that such investments were covered by deposit insurance. See Federal Deposit Insurance Corporation, "FDIC Issues Final Rule Regarding False Advertising, Misrepresentations About Insured Status, and Misuse of the FDIC's Name or Logo," press release, 17 May 2022.

54 Financial Stability Board Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022, page 18.

Whether regular, audited disclosures of the assets backing a Stablecoin can this reduce this susceptibility remains to be seen. In theory, sharing details of the composition and allocation of reserves reduces the risk of "runs" based on lack of information, since the liquidity of the reserves is the primary determinant of the ability of a Stablecoin to maintain its peg to a fiat currency.

"Transparency" into reserves is now seen as essential to maintaining the stability of Stablecoins, leading some to call for regulators to impose standards on the levels of disclosure. The FSB has begun work on this, publishing a "template for common disclosure[55] of reserve assets" in October 2022, which advocates simple daily and weighted average values be published.[56]

Technology can help with disclosure. Poundtoken, the issuer of the Sterling Stablecoin GBPT, is the first to allow holders to check the reserves backing the coin at all times in real-time.[57] This tackles the reality that the reserves underpinning a Stablecoin are not static and can change their composition even before a purchase or sale is complete.

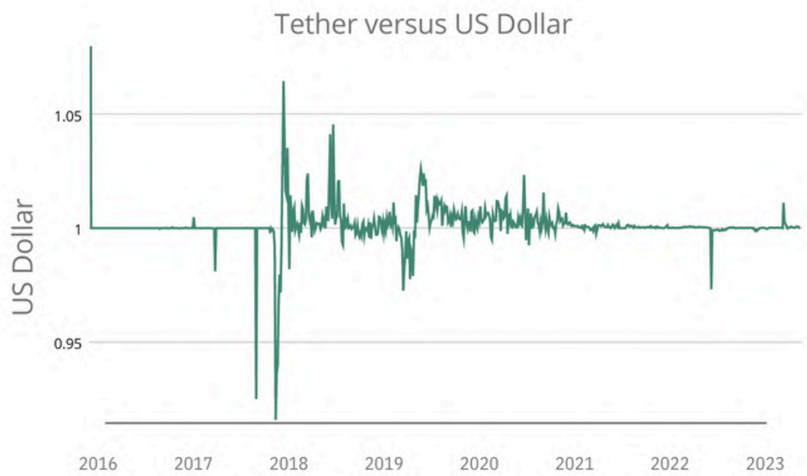
Similarly, the Bank for International Settlements (BIS) Innovation Hub in London is exploring the use of technology to monitor the liabilities of fiat-backed Stablecoins and the assets that back them. Project Pyxtrial aims to develop a prototype that collects, stores and analyses data in pursuit of possible asset-liability mismatches. If it works, regulators are bound to be interested.

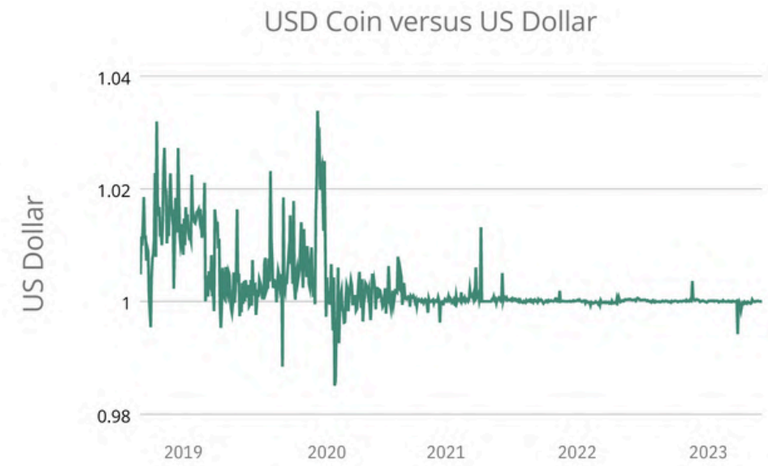
But in practice, even the best information is unlikely to be sufficient, especially in stressed market conditions. As the Chart shows, what regularly knocks the three main non-bank, fiat currency-backed Stablecoins off sustained periods of price stability is uncertainty in the wider cryptocurrency markets, to which Stablecoins are closely linked - and not only by their association with algorithmic Stablecoins.

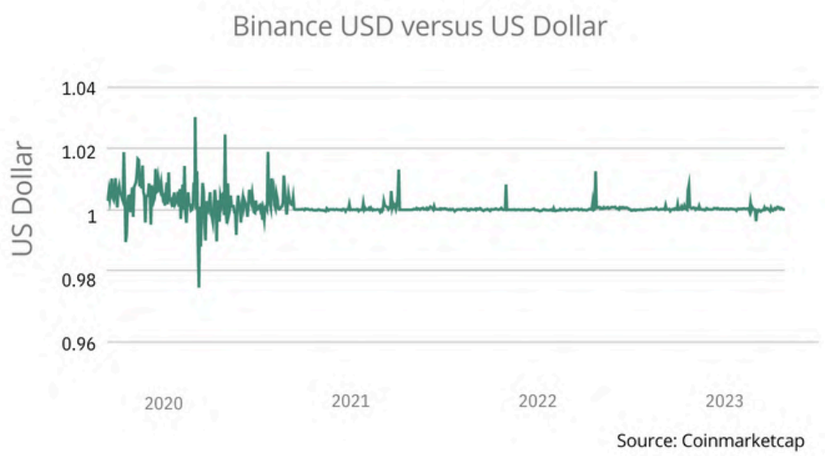
55 See, for example, Coinbase, Stablecoins White Paper, July 2022, page 26.

56 Financial Stability Board, , Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022, Annex 2, page 24.

57 See Real-time Proof of Reserve at https://poundtoken.io/







Source: Coinmarketcap

In August 2022 the HUSD Stablecoin, which disclosed that it was backed by cash held in the form of bank deposits, lost its peg.[58] So increased transparency will never eliminate the risk of asset-backed Stablecoins losing their peg and needing to make fire sales of assets to meet redemptions in stressed markets.

And any Stablecoin issuer that has to draw on its bank deposits and sell Treasury securities to honour its pledge to redeem coins at par retains the potential to disrupt the wider money markets. Yet any Stablecoin backed by fiat currency assets is still the least unstable variety of Stablecoin, as the history not just of algorithmic Stablecoins but of other types of Stablecoin shows.

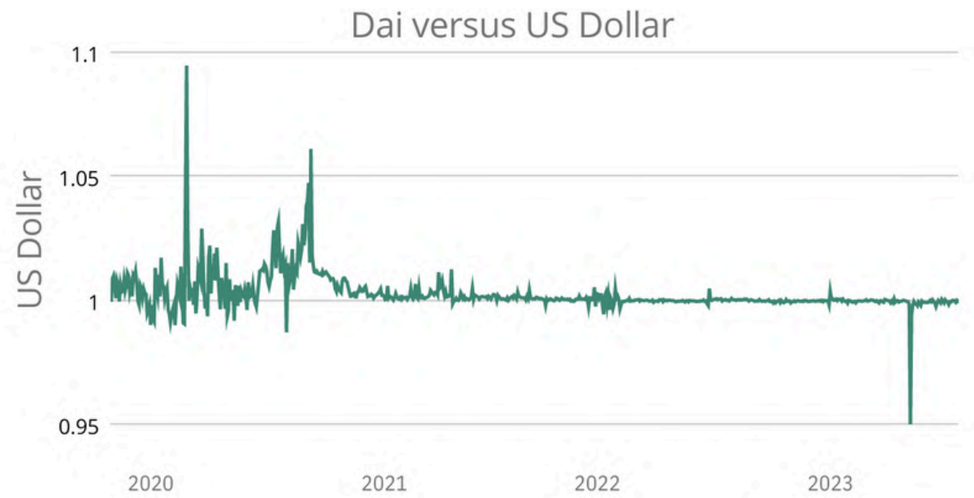
58 Coindesk, Cash-Backed HUSD Stablecoin Loses Peg, Drops to 92 Cents, 18 August 2022.

Stablecoins backed by cryptocurrencies

Stability is not the principal feature of the second main variety of Stablecoin: those collateralised with cryptocurrency tokens issued on to blockchain networks. A 2021 study of 20 Stablecoins found that cryptocurrency-backed Stablecoins were three times as volatile as those backed by fiat currency assets and more volatile even than the small number of algorithmic Stablecoins in the data sample.[59]

The most stable of the Stablecoins backed by cryptocurrency assets analysed by the study is DAI (see Chart), a Stablecoin pegged to the US dollar and backed by the cryptocurrencies that holders can deposit in exchange for DAI (mainly Ether and Bitcoin but also tokens issued by DeFi protocols such as Uniswap and Yearn and the Metaverse realtor Decentraland, where DAI is helpful to traders).

The first secret to the stability of DAI is over-collateralisation. Technically, users of DAI are borrowing the Stablecoin against deposits of cryptocurrencies as collateral and, although the collateral ratio can vary between 101 per cent and 175 per cent according to the riskiness of the cryptocurrency deposited, DAI is generally backed by collateral worth 150 per cent of the borrowing.



Source: Coinmarketcap

59 Klaudia Jarno and Hanna Kołodziejczyk, Does the Design of Stablecoins Impact Their Volatility? Journal of Risk and Financial Management, 20 January 2021, 14: 42. https://doi.org/10.3390/jrfm14020042

This over-collateralisation is characteristic of the business model of the operators of lending protocols in the DeFi markets to which DAI properly belongs. It compensates for the lack of credit intermediaries (such as banks) to assume the risk of borrower default but does not eliminate the risk of the price of the collateral falling precipitously in a stressed marketplace as holders sell to avoid losses.

In practice, over-collateralisation ensures the value of the assets backing DAI can fall by a third before they threaten the peg against the US dollar. If the value of the cryptocurrencies that back DAI start to depreciate, an algorithm triggers a liquidation of the Stablecoin automatically, to bring the quantity in issue in line with the value of the collateral.

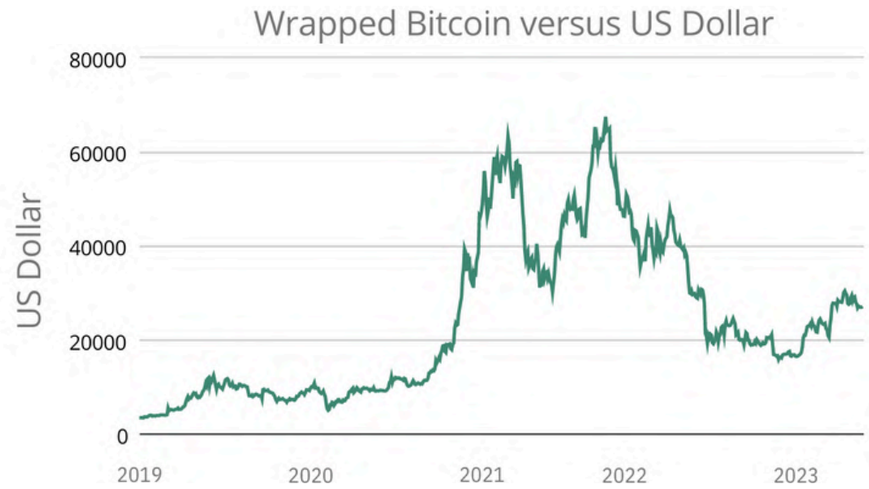
This could precipitate a pro-cyclical fire-sale, but the mechanism seems to have worked in the crisis of March 2023, when DAI plunged to levels not seen since it launched in November 2019 but recovered quickly.

It helps that the DeFi markets DAI serves are not large. With the total value locked (TVL) in all DeFi protocols having fallen to less than US$50 billion - it was US$48.6 billion in March 2023, down from a peak US$179.2 billion in November 2021 - DeFi lending protocols are not big enough to cause a financial crisis even if the worst happened.[60]

Liquidation is not the only way DAI is stabilised against the US dollar either. The algorithm also adjusts automatically the interest rate paid by borrowers of DAI. It lowers the rate to encourage borrowing when DAI is trading above US$1.00 (increasing the quantity in issue) and raises it to discourage borrowing when DAI is trading below US$1.00 (decreasing the quantity in issue).

This mechanism is not always effective. During the DeFi yield farming boom in 2020, demand for DAI to use in liquidity pools such as Curve, Compound, Uniswap, Sushiswap and Yearn drove the price as high as US$1.10. The interest rate was cut to zero, but it failed to suppress the price of DAI. A decision to diversify the range of cryptocurrencies acceptable as collateral proved - counter-intuitively, given the tendency of cryptocurrencies to rise and fall in unison - more effective.

60 See https://defillama.com/



Source: Coinmarketcap

The history of Wrapped Bitcoin (WBTC), a tokenised version of Bitcoin issued on to the Ethereum blockchain, shows what happens when a coin is backed by a single cryptocurrency - even the biggest and most successful cryptocurrency of all. While predictably steady against Bitcoin itself, its dollar value has (equally predictably) tracked the highly volatile US dollar price of Bitcoin (see Chart).

But diversification of collateral reduces rather than eliminates the risk of a catastrophic fall in the value of the collateral, particularly in stressed markets. Over-collateralisation is the obvious solution but – as the experience of conventional financial markets in 2007-08 illustrates - the appropriate collateral is hard to gauge and agree between counterparties even with the assistance of mathematical models based on historical data.

The real weakness of over-collateralisation is that it is an expensive way to maintain stability since the assets posted as collateral could in principle be put to more remunerative uses. These weaknesses make cryptocurrency-backed Stablecoins less attractive even to professional traders active in the cryptocurrency markets.

The capital inefficiency of over-collateralisation has spawned a variant of the cryptocurrency-backed Stablecoin: the "Delta-neutral" Stablecoin. The US dollar-pegged UXD Delta-neutral Stablecoin issued on to the Solana blockchain, for example, aims to enable users to obtain US$1.00 of UXD in exchange for US$1.00 of cryptocurrency rather than the US$1.50 of DAI.

The design of UXD draws on a strategy commonly used in equity options trading, where an investor holds a portfolio of long and short positions whose Delta – how much the price of an option changes for every US$1.00 move in the price of the underlying equity – is zero. UXD aims to maintain a 1:1 ratio by collateralising UXD with a

Delta-neutral position. It is not without risks (see Box below).

But then UXD is not aimed at investors. Its target users are professional traders active in the DeFi markets that value its capital efficiency by comparison with DAI. The needs of this audience are the ultimate origin of every Stablecoin. In the absence of fiat currency on blockchain networks, professional traders need an alternative stable store of value.

UXD: Like algorithmic Stablecoins, UXD relies on arbitrageurs to maintain the US$1.00 peg. Users create Delta-neutral positions on UXD when their short position in a cryptocurrency on a DeFi derivatives exchange (such as Mango Markets) is equivalent to the value of the long position in the same cryptocurrency exchanged for UXD. If the value of the cryptocurrency goes up, the gain on the long position is offset exactly by the loss on the short position – and vice-versa if the value of the cryptocurrency falls. The challenge is to achieve this in practice when reality is less efficient than theory. In reality, it takes time to agree transactions on DeFi derivatives exchanges, and the price can move. The derivatives exchanges might also experience bouts of illiquidity, especially if selling is heavy. The smart contracts by which DeFi derivatives exchanges operate rely on [data] "oracles" to deliver price information, and these can be slow, leading to a divergence between the market price of a cryptocurrency and the "virtual" price of the same cryptocurrency on the derivatives exchange. These inefficiencies are obviously unhelpful to a Stablecoin that wants the option and underlying prices to stay aligned, and the designers of UXD have sought to counter the problem by introducing a so-called "funding rate." If the price of the underlying in the market is above the virtual price on the derivatives exchange, buyers pay the difference to sellers, and vice-versa if the price in the market is below the virtual price on the derivatives exchange. If it works as intended, the "funding rate" will bring the market and exchange prices of the same underlying asset into alignment, by bringing sellers or buyers into the market to collect a reward in the form of the "funding rate." This "funding rate" affects the cryptocurrencies backing the UDX Stablecoin. The Delta-neutral position of the UXD Stablecoin means the cryptocurrency collateral must always either generate income for holders of UXD or oblige holders of UXD to pay income to others, depending on market conditions. When the funding rate is positive for holders, the UXD holders collect it. To protect them against having to pay when the funding rate is negative, the designers of UXD have established an "insurance fund" to pay out the negative funding rate so that UXD holders do not have to do so. Of course, sustained negative funding rates could deplete the insurance fund. If UXD holders have not redeemed their UXD Stablecoin for cryptocurrency assets at the exchange rate of US$1.00 by the time that happens, the UXD Stablecoin will become under-collateralised as cryptocurrency prices fall, and it could prove impossible to restore the peg and prevent a Terra-style collapse.

How professional cryptocurrency traders use Stablecoins

The earliest professional investors in cryptocurrency used Stablecoins as a (relatively) stable point of entry to the cryptocurrency markets and as a safe, low volatility refuge from the periodic crashes in the prices of cryptocurrencies. It was and is faster - and, importantly, cheaper - to use a Stablecoin continuously on-chain than to come on and off the blockchain network repeatedly by converting fiat currency into cryptocurrency or cryptocurrency into fiat currency via traditional, bank-run payments systems.

Being on-chain, Stablecoins can also support the round-the-clock trading of cryptocurrencies. They provide a common unit of account for cryptocurrency exchanges and their users. Indeed, cryptocurrency exchanges often list cryptocurrencies as trading pairs with Stablecoins.

Stablecoins also enabled cryptocurrencies to spawn the DeFi markets, where entrepreneurs have developed financial services that explicitly reject intermediation by banks. By allowing investors and traders to buy, sell, borrow, lend and store the value of tokenised assets on blockchain networks, without fiat currency or regulated financial intermediaries, Stablecoins fuelled the growth of token issuance in the DeFi markets.

As IOSCO noted in its report on DeFi, "the use of

Stablecoins to facilitate transactions involving trading, lending and borrowing, between and among platforms and protocols, has enabled DeFi to become the fastest growing sector in the crypto industry." [61]

As tokens were issued, an eco-system of competing blockchain protocols, cryptocurrency exchanges and digital wallets developed to support them. Stablecoins are now deeply embedded in the cryptocurrency and DeFi markets. Indeed, arbitrageurs using cryptocurrencies, cryptocurrency exchanges and digital wallets are now crucial to the workings of many Stablecoin stability mechanisms.

Providing a stable refuge from volatile cryptocurrencies remains a vital function of Stablecoins, but their use by cryptocurrency traders has become more sophisticated over time. Stablecoins are now an integral part of an evolving infrastructure that supports the lending and borrowing as well as the trading of a wide variety of tokenised assets in a complicated universe of digital asset trading platforms.

Indeed, contributing to the realignment of a Stablecoin that has drifted away from its currency peg is one of the lowest-risk profit opportunities in the cryptocurrency and DeFi markets. The UXD "funding rate," for example, provides an incentive for traders to rebalance the Stablecoin. The guaranteed profits of the Terra/LUNA exchange rate provided a similar incentive.

But cryptocurrencies and DeFi also provide more speculative opportunities. At the height of the DeFi boom of 2020-21, traders found that, instead of earning 1-2 per cent on a fiat currency bank deposit, they could collect 6-8 per cent by "staking" (holding cryptocurrency to collect fees for verifying blockchain transactions) or "yield farming" (lending cryptocurrencies in return for interest).

The borrowers in yield farming arrangements were other speculators looking to capitalise on swings in the price of a cryptocurrency by leveraging their buy or sell positions. These speculators spawned automated market makers (AMMs) and liquidity pool providers such as Uniswap where Stablecoin and cryptocurrency or DeFi token pairs could be traded in an algorithmic, decentralised way.

To profit from lending cryptocurrencies or from borrowing cryptocurrencies or DeFi tokens to leverage positions, traders need to be able to move assets across different blockchain protocols using a medium akin to fiat currency cash. Stablecoins useable on multiple blockchains, and exchangeable through cryptocurrency exchanges and tradeable on AMMs as well as with the issuer, fulfil that function.

61 The Board of the International Organisation of Securities Commissions (IOSCO), Decentralised Finance Report: Public Report, March 2022, page 17.

Regulatory concern about the links between cryptocurrency markets and Stablecoins

These uses of Stablecoins were observed with mounting concern by regulators. In April 2022, Gary Gensler, chairman of the Securities and Exchange Commission (SEC), noted that "Stablecoins are so integral to the crypto eco-system that a loss of the peg or a failure of the issuer could imperil one or more trading platforms, and may reverberate across the wider crypto eco-system." [62]

A crisis in the "crypto eco-system" has now occurred. The total value of cryptocurrencies fell from a peak of nearly US$3 trillion in November 2021 to less than US$800 billion in late 2022, and even after the recent recovery is still around US$1.2 trillion only. [63]

Total value locked (TVL) in DeFi protocols fell from US$179.3 billion to a low of less than US$40 billion in January 2023, and had recovered by March to around US$50 billion only. TVL on the Ethereum blockchain alone fell even faster, from a high of US$110 billion in November 2021 to a low of less than US$23 billion by January 2023. [64]

Clearly, the reliance of Stablecoins on cryptocurrency exchanges and digital asset trading platforms for issuance, distribution, storage and exchange for cryptocurrencies or fiat currencies – and, indeed, on trading activities for preserving their currency pegs – means that any failure or disruption to the exchanges or digital asset trading platforms could undermine a Stablecoin. The de-peggings that followed the collapse of FTX in November 2022 proved that.

Conflicts of interest are a further source of concern. The larger Stablecoins all emerged from cryptocurrency exchanges, yet those

62 Prepared Remarks of Gary Gensler on Crypto Markets, Penn Law Capital Markets Association Annual Conference, 4 April 2022.

63 https://coinmarketcap.com/charts/

64 https://defillama.com/

Stablecoins cannot always (unlike fiat currency) be redeemed by those exchanges as the issuer, only bought and sold on their exchanges.

Custody is another obvious point of risk, since investors often hold their Stablecoins in digital wallets provided by the exchanges. The risk that customer and proprietary assets (including Stablecoins) will be commingled rather than segregated is high. Which immediately raises questions about the ownership and control of assets, and the rights of custodians of customers' property to use them as they see fit.

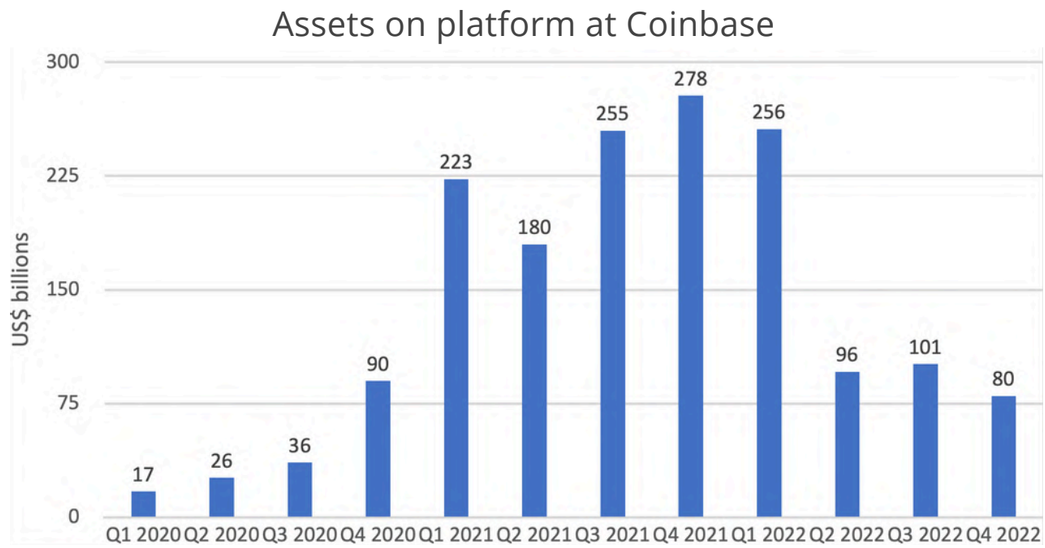
Such questions are long familiar in the securities financing and prime brokerage industries of traditional finance. In fact, students of the financial crisis of 2007-08 will experience a strong sense of déjà vu when they read this passage in the Financial Stability Oversight Council (FSOC) report of October 2022:

Leverage in crypto-asset markets sometimes involves the practice of rehypothecation, which can generate additional leverage by reusing the same collateral to secure multiple instances of leverage. For example, a crypto-asset platform might make a loan backed by crypto-assets, such as Stablecoins, and the platform might then secure a loan using the posted collateral. Platforms that engage in this type of activity may have large risk exposures as a result. The extent of this activity is obscured by lack of adequate disclosure about rehypothecation, raising serious risk that vulnerabilities could build up unseen. Because rehypothecation appears to commonly involve Stablecoins, leverage may interact with the other vulnerabilities posed by Stablecoins, including run risk. **65**

There are other important questions to ask beyond whether a cryptocurrency exchange is free to "re-hypothecate" (borrow, lend, pledge, post as collateral or otherwise encumber) customer assets. Is the exchange liable if the assets are lost or stolen? Are the assets of customers segregated from the assets of the exchange or held in an "omnibus" wallet? Are customers able to access the assets and transfer them elsewhere? Is the exchange liable if the assets are held by sub-custodians which fail or lose assets? Who owns assets if an exchange files for bankruptcy?

Yet until the SEC issued an advisory notice[66] in March 2022, cryptocurrency exchanges were not obliged to recognise any liability to safeguard their customers' assets. Coinbase, for example, whose customer wallets contained assets worth more than US$250 billion at the peak (see Chart), did not recognise the assets and the corresponding liability on its balance sheet until SAB 121 was issued.[67]

Complying with SAB 121 means the exchange is looking after customer assets and not its own. Like traditional custody, these customer assets can still be plied with income-generating services such as "staking" and "farming."



Source: Coinbase Global, Inc., SEC Forms 10Q and 10k

The "subscription and services" revenue generated by these assets totalled US$517.5 million at Coinbase in 2021 and US$792.6 million in 2022, of which custody fees are a shrinking proportion as the value of cryptocurrency "assets on platform " has declined.[68] Unlike traditional custody, the assets are – thanks to SAB 121 - on the Coinbase balance sheet.

SAB 121 amounts to a tacit admission by the SEC that the cryptocurrency and DeFi markets were scarcely regulated at all. That non-compliance with traditional financial regulations is itself a risk that regulators around the world are now addressing.[69]

Manipulative trading activity (notably "pump and dump" schemes) is already commonplace in the cryptocurrency and DeFi markets. The price data "Oracles" on which the smart contracts that drive some Stablecoins rely also create opportunities for market abuse.

65 Financial Stability Oversight Council (FSOC), Report on Digital Asset Financial Stability Risks and Regulation 2022, page 64.

66 The SEC Staff Accounting Bulletin No. 121 (SAB 121) in April 2022. It outlines how the SEC expects regulated entities to account for obligations to safeguard the "crypto-assets" (including Stablecoins) of third parties.

67 Coinbase Global, Inc., SEC Form 10Q, quarterly period ended 30 June 2022, page 49.

68 Custodial fee revenue totalled US$117.7 million in 2021 (23 per cent of the total) and US$56.4 million (7 per cent of the total) in 2022. Coinbase Global, Inc., SEC Form 10K, annual reports for the year ended 31 December 2021, page 141, and annual report for the year ended 31 December 2022, pages 106-7.

69 See page 115-116 below. See also Why the case for regulating cryptocurrencies is becoming unanswerable, July 2022, at https://futureoffinance.biz/2022/08/08/why-the-case-for-regulating-cryptocurrencies-is-becoming-unanswerable-2/.

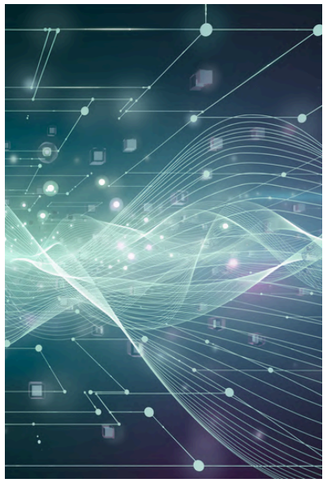
Regulatory action on financial crime

But to date it is money laundering that has bothered regulators the most. This is counter-intuitive, in the sense that digital asset transactions on blockchain networks, while usually anonymous, are recorded on searchable databases in considerable detail: the date, the amount, the time, the addresses. Law enforcement agencies have actually used this information to catch criminals.

This helps to explain why criminal activity accounts for a minimal share of total cryptocurrency market volumes. According to Chainalysis, the share of all cryptocurrency activity associated with illicit activity rose from 0.12 per cent in 2021 to 0.24 per cent in 2022, having peaked at 1.9 per cent in 2019.[70] For criminals, visible digital assets are less useful than invisible cash.

But crime is obviously occurring and the potential for it to increase, especially through the involvement of State actors in sanctioned states, is evident. The obvious solution is for regulated financial institutions to monitor activity, so for several years international regulators have insisted that firms active in the cryptocurrency and DeFi markets be subject to the Financial Action Task Force (FATF) recommendations on know your client (KYC), anti-money laundering (AML), countering the financing of terrorism (CFT) and sanctions screening.[71]

In October 2018, the FATF adapted its recommendations to make clear they applied to all digital assets, including Stablecoins. The changes were supplemented with an Interpretative Note and updated guidance in June 2019, which FATF has since updated further.[72]



70 Chainalysis, The 2023 CryptoCrime Report, February 2023, page 7.

71 AML, CFT and sanctions screening were priorities of both the Financial Stability Board (FSB) and the G7 reports on Stablecoins, in which issuers and intermediaries were urged to comply with the Financial Action Task Force (FATF) Recommendations.

72 See Financial Action Task Force (FATF), Virtual Assets and Virtual Asset Service Providers: Updated Guidance for a Risk-Based Approach, October 2021.

Cryptocurrency and DeFi industry complaints about the consequent implementation by national governments of the so-called "Travel Rule"[73] are legion. Yet in reality few jurisdictions have made material progress in forcing companies to comply.[74]

And Stablecoins, like any financial asset, can be used to launder money, fund terrorism and evade sanctions. Criminals that use Stablecoins nevertheless face the same risks of detection as they do with any asset transferred across a blockchain network. In addition, most of the leading, Stablecoin issuers boast of their compliance with the FATF Recommendations.

The leisurely approach of national regulators is understandable. A draconian approach would divert activity to less scrupulous jurisdictions, while the high costs and poor track record of AML and CFT measures in detecting and preventing financial crime suggests returns will be low. Indeed, the costs of compliance are now almost as high as the losses occasioned by financial crime.[75] In addition, countering the financing of terrorism often involves tracing trivial sums.

If financial crime is a less urgent priority for regulators than it seems, the use of Stablecoins in crypto-on-crypto transactions – even excessively leveraged ones – is not an urgent priority for them either. Although regulators know that the risk of spill over effects in the traditional financial markets is not negligible, they also know it is not systemic either. What has really worried regulators is the possibility that Stablecoins will displace fiat currencies.

73 Under Financial Action Task Force (FATF) Recommendation 16, the originators and beneficiaries of all transfers of digital funds must exchange identifying information. This is known as the "Travel Rule."

74 Of 98 jurisdictions that responded to a survey by the Financial Action Task Force (FATF) in March 2022, only 29 had passed relevant Travel Rule laws, 36 had yet even to start on legislation and only 11 had started enforcement. No jurisdiction was fully compliant and only 12 were even "largely compliant." The FATF de minimis transaction threshold is US$1,000 or €1,000, but jurisdictions have named higher and lower amounts, prompting industry calls for standardisation.

75 See Future of Finance, It is time to stop wasting money on a failed and broken approach to defeating financial crime, 24 February 2022 at https://futureoffinance.biz/it-is-time-to-stop-wasting-money-on-a-failed-and-broken-approach-to-defeating-financial-crime/

What regulators really fear: Libra or its equivalent

Cryptocurrency and DeFi market traders using Stablecoins to park profits and arbitrage blockchain protocols is one thing. Households and businesses using Stablecoins to make payments to each other and store value is a much more ominous threat to the current dispensation. If local consumers and businesses preferred to be paid in and hold a Stablecoin denominated in another currency, central banks would lose control of local monetary conditions.

The risk of ceding control to another currency is something many central banks currently inhibit by preventing commercial banks offering foreign currency accounts and by refusing to clear and settle foreign currency transactions through the domestic payments market infrastructures they operate.

Stablecoins not only bypass these physical constraints. In using fiat currency cash and money markets instruments as reserves, they threaten the stability of bank funding too – by competing for customer deposits and the high-quality liquid assets (HQLAs) such as Treasury bills that banks are obliged by regulators to hold to ensure they remain liquid. If banks are less robust, that is a direct supervisory problem for central banks too, because it is through banks that they implement monetary policy decisions.

Most Stablecoins are issued by non-banks. Indeed, it was the announcement by the non-bank Facebook on 18 June 2019 that it intended to launch a multi-currency Stablecoin called Libra that first seriously alarmed central banks about the threat posed by Stablecoins. Backed by a social media platform with nearly three billion users around the globe, Libra could have achieved global dominance, robbing central banks of control of monetary conditions, disrupting established payment mechanisms, undermining bank funding and disrupting the manufacture of credit.

The G20, meeting in Osaka ten days after the Facebook announcement, commissioned the FSB to propose "multi-lateral" measures to mitigate the potential "threat to global financial stability."[76] By February 2020, with Libra scheduled to launch that summer, alarmed members of the G20 were emphasising the urgency of analysing the risks of Libra-style Stablecoins before they were launched.

In April 2020 the FSB published a 67-page consultation paper on what regulators were coyly terming "global Stablecoins" (GSCs).[77] It itemised vulnerabilities in existing regulatory regimes that GSCs could exploit; analysed the risks GSCs posed to financial stability; and made ten recommendations to national authorities for regulating "privately-issued GSCs predominately (sic) intended for retail use."

The ten Recommendations survived – only lightly edited as a result of the consultation process – into the final report of the FSB, which was published on 13 October 2020. Lightly altered again, they reappeared in a subsequent review and consultation paper published two years later.[78] The G20 endorsed the Recommendations.

They amount (see Box) to a (somewhat uninspiring) list ....

of exhortations to national regulators to ensure Stablecoins with the pretensions of Libra do not escape any of the burdens laid on conventional issuers of money – namely, banks.

76 G20 Osaka Leaders' Declaration, 29 June 2019, page 4.

77 Financial Stability Board, Addressing the regulatory, supervisory and oversight challenges raised by "global stablecoin" arrangements: Consultative document, 14 April 2020.

78 Financial Stability Board, Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Final Report and High-Level Recommendations, 13 October 2020, and Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements Consultative report, 11 October 2022.

FSB ten Recommendations to address the regulatory, supervisory and oversight challenges raised by GSC arrangements, October 2020 (as amended in October 2022)	FSB questions designed to standardise the implementation by different jurisdictions of the ten Recommendations, October 2021
1. Authorities should have and utilise the necessary or appropriate powers and tools, and adequate resources, to comprehensively regulate, supervise and oversee a GSC arrangement and its associated functions and activities, and enforce relevant laws and regulations effectively. *(The FSB recognises that establishing powers and tools for regulators is a domestic responsibility but wants every jurisdiction to be ready to mitigate threats to stability from a GSC.)* 2. Authorities should apply comprehensive regulatory, supervisory and oversight requirements consistent with international standards to GSC arrangements on a functional basis and proportionate to their risks insofar as such requirements are consistent with their respective mandates. *(Functions refer to digital custody wallets, trading platforms and other intermediaries and standards to bank capital and liquidity requirements, FATF financial crime recommendations and the CPMI-IOSCO PFMIs.)* **79** 3. Authorities should cooperate and coordinate with each other, both domestically and internationally, to foster efficient and effective communication, information sharing and consultation in order to support each other in fulfilling their respective mandates and to ensure comprehensive regulation, supervision, and oversight of a GSC arrangement across borders and sectors. **80** 4. Authorities should require that GSC arrangements have in place a comprehensive governance framework with clear and direct lines of responsibility and accountability for the functions and activities within the GSC arrangement. *(In this case, the FSB is concerned to eliminate the risk that Stablecoins issued on to public, permissionless ledgers and governed on a "decentralised" basis escape responsibility for complying with regulations covering operation of the stabilisation mechanism, the investing of the reserves, providing safe custody for the reserve assets, and providing user-facing services such as exchanges and wallets.)* 5. Authorities should require that GSC arrangements have effective risk management frameworks in place especially with regard to operational resilience, cyber security safeguards and AML/CFT measures, as well as 'fit and proper' requirements, if applicable, and consistent with jurisdictions' laws and regulations. *(FSB is concerned here not only with financial crime but liquidity management to support effective working of stabilisation mechanisms.)* 6. Authorities should require that GSC arrangements have in place robust systems for collecting, storing and safeguarding data. *(The implication is that regulators should have access to the data stored.)* 7. Authorities should require that GSC arrangements have appropriate recovery and resolution plans. 8. Authorities should require that GSC issuers provide all users and relevant stakeholders with comprehensive and transparent information to understand the functioning of the GSC arrangement, including with respect to governance framework, redemption rights and its stabilisation mechanism. *(The FSB is interested primarily in specific disclosures about redemption mechanisms and the composition of reserves on a consistent basis.)* 9. Authorities should require that GSC arrangements provide a robust legal claim to all users against the issuer and/or underlying reserve assets and guarantee timely redemption. For GSCs referenced to a single fiat currency, redemption should be at par into fiat. To maintain a stable value at all times and mitigate the risks of runs, authorities should require GSC arrangements to have an effective stabilisation mechanism, clear redemption rights and meet prudential requirements. *(The FSB is concerned to ensure issuers guarantee clear, legally enforceable redemption rights, effective stabilisation mechanisms and adequate capital buffers to absorb credit, market, legal, operational and cyber-security risks.)* 10. Authorities should require that GSC arrangements meet all applicable regulatory, supervisory and oversight requirements of a particular jurisdiction before commencing any operations in that jurisdiction and adapt to new regulatory requirements as necessary and as appropriate. *(The FSB is here concerned to ensure Stablecoins comply with broader cryptocurrency and digital asset regulations as well as those applying to traditional assets.)*	1. Which is the appropriate regulatory authority or authorities to regulate and supervise Stablecoin arrangements? Do their existing regulatory perimeters need to be revised to take account of multiple functions and multiple participants in governance, issuance, redemption, reserve management, stabilisation, transfer of coins and interaction with users? 2. Who should be allowed to issue Stablecoins? How should intermediaries be regulated? Should maturity transformation be disallowed? Should exceptions to redemption at par be permitted? Should Stablecoins be regulated as systemically important payment systems? How should the CPMI-IOSCO Principles for FMIs be applied to any Stablecoins used for payments? 3. How should regulators practise and document cooperation and coordination? What information can be used to identify critical entities, links and emerging risks? How can regulation be enforced? Should issuers incorporate locally? How can regulations be aligned against arbitrage? Should a lead regulator be appointed? 4. What are the best ways to address potential conflicts of interest among different entities in different jurisdictions, including those created through GSC governance arrangements? What governance features should be required of GSC arrangements? How should fully permissionless ledgers or similar mechanisms and a decentralised issuance of Stablecoins be treated? Are there any conditions under which such arrangements could provide the necessary degree of accountability? 5. How can regulators assess the effectiveness of risk management? What requirements should be applied to issuance, transfer, custody, operational infrastructure and storage of private keys? What extra requirements should apply to regulated financial institutions, such as banks, that issue Stablecoins, in addition to existing regulations? 6. Can GSC arrangements meet data privacy and AML/CFT and sanctions screening obligations and access to data by regulators for surveillance purposes? 7. Is the insolvency regime adequate? Should reserves be segregated or insured? 8. How can regulatory authorities ensure that disclosures by Stablecoin issuers to users across jurisdictions are consistent and meet the requirements in the relevant jurisdictions where particular users are located? How comprehensive and transparent is the information disclosed, especially in terms of the stabilisation mechanism and composition of reserves? 9. Should specific requirements apply to the nature and enforceability of a GSC redemption claim in normal times and in stressed markets? Are there limits or exceptions to redemption at par value? Is redemption enforceable for all GSC holders wherever they are located? Which regulator should be responsible for assessing the redemption rights and processes? How can regulators ensure that redemption and stabilisation mechanisms are sound, in terms of the credit quality and liquidity of reserves, and capital and liquidity requirements laid on issuers? 10. Should authorities specify the criteria they will use to assess the determination of a GSC and additional prudential requirements that may apply? What are the ways jurisdictions can assure compliance with all applicable regulatory, supervisory and oversight requirements in their jurisdictions, including regulations that apply to traditional financial assets, cryptocurrencies and digital assets?

Source of Box: Financial Stability Board, Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Final Report and High-Level Recommendations, 13 October 2020; Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements Progress: Report on the implementation of the FSB High-Level Recommendations, 7 October 2021; and Financial Stability Board, Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022.

By the end of 2020, Libra was sufficiently persuaded by the regulatory backlash to shrink the scope of the project to the US dollar and US consumers alone and change the name of the Stablecoin to Diem in an effort to distance it from Facebook. By May 2021, Diem had also withdrawn its 12-month-old application to the Swiss Financial Market Supervisory Authority (FINMA) to be authorised as a payment system.

Regulatory concern had by then shifted to the rising class of other non-bank, asset-backed Stablecoins such as Tether and USDC and cryptocurrency-backed coins such as DAI. By the time the FSB published a progress report on implementation of the ten Recommendations in October 2021, the market capitalisation of these various Stablecoins had grown to more than US$120 billion.

The 2021 FSB review concluded that, although Tether and USDC and other Stablecoins provided a crucial link between fiat currencies and cryptocurrency markets, they did not yet represent a systemic risk to global financial stability on the same scale as Libra.

The FSB was more concerned to find, after surveying 48 jurisdictions, that progress towards its ten Recommendations was both varied – some countries were re-writing or amending regulations while others were relying on existing rules - and limited.

The variety of approaches, warned the FSB, risked market fragmentation and regulatory arbitrage, allowing a global Stablecoin to affect investors in well-regulated countries by basing itself in a loosely regulated jurisdiction. It proposed some questions regulators might pose against each of the ten Recommendations, with the aim of standardising the approach different jurisdictions were taking (see Box). **81**

By the time the FSB re-visited Stablecoins in its review and consultation paper of October 2022, it was able to report progress on implementation but its concerns about regulatory fragmentation had not abated. It had also developed fresh anxieties in the wake of the slow implosion of the cryptocurrency markets in general over the previous year and the impact on all outstanding Stablecoins of the Terra/LUNA collapse of May 2022.

79 The 24 Principles for Financial Market Infrastructures (PFMIs) were published by the Committee on Payments and Market Infrastructures (CPMI) and the International Organisation of Securities Commissions (IOSCO) in April 2012 to reduce the risks to financial stability posed by financial market infrastructures (FMIs) such as payments systems and securities clearing and settlement utilities. See "Applying the PFMIs to Stablecoins" below.

80 Annex 1 of Financial Stability Board, Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022, contains a template for information-sharing arrangements between regulators (pages 22-23).

81 Financial Stability Board, Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements Progress: Report on the implementation of the FSB High-Level Recommendations, 7 October 2021, page 1.

Unequal Redemption Rights

In theory, Stablecoins are stable precisely because they offer redemption into fiat currency at a 1:1 rate. In practice, holders often redeem at a discount, and can face other restrictions. Tether, for example, sets a high minimum redemption amount (US$100,000), and charges both a verification fee (US$150) and a transaction fee (the higher of US$1,000 or 0.1% of the transaction).[82]

Faced with restrictions of this kind, the majority of retail holders of Stablecoins must rely on cryptocurrency exchanges to convert their stablecoins to fiat currencies. As the FSB put it in its report on Stablecoins of October 2022:

> **The largest Stablecoin issuers constrain users' redemption rights by limiting the types of users that can redeem directly with the issuer. Some issuers offer redemption only weekly, reserve a broad ability to delay or deny redemptions, impose account eligibility requirements, or set high minimum thresholds for redemptions. The result of these limitations is that most users must sell their Stablecoins on exchanges at prevailing market prices, where the redemption price is not guaranteed.[83]**

It is significant that, on Stablecoin websites, it is much easier to find information about how to buy the Stablecoin than it is to redeem it. In the United States, the Financial Stability Council (FSOC) has likened the lack of redemption rights for retail investors to the inability of cryptocurrency investors to access their holdings when cryptocurrency brokers and lenders have failed.[84]

These events raised questions of exactly the sort - the equality and enforceability of redemption rights (see Box), reserve investment policies, the composition of reserves, the robustness of stabilisation mechanisms, levels of disclosure by Stablecoin issuers and the governance of Stablecoins – that the ten FSB Recommendations and sample questions were designed to address.

After reviewing the largest non-bank Stablecoins still in issue, the FSB concluded starkly that none of them would satisfy the ten Recommendations. It found existing Stablecoins were all lightly regulated and largely unaffected by the capital, liquidity, cyber-security, data protection and financial crime requirements imposed on banks.

The FSB also found Stablecoins were investing their reserves as they saw fit, disclosing insufficient to information to investors about how the Stablecoin was managed as well as invested and not offering all holders an equal, reliable and legally enforceable redemption mechanism (see Box). The FSB expressed reservations about the reliability of their stabilisation mechanisms too, especially in stressed markets.[85]

"The existing Stablecoin arrangements analysed would not meet the FSB's High-level Recommendations," concluded the FSB. "They would need to make significant improvements to their governance, risk management, redemption rights, stabilisation mechanisms and disclosures, in order to meet the High-level Recommendations – and in particular 4, 5, 8 and 9 – if they are GSCs or have the potential to become GSCs."[86]

This was striking. The FSB was urging national regulators to extend application of the ten Recommendations to any Stablecoin with even the potential to become a GSC, and indeed to any Stablecoin that was big or complicated or risky enough to raise concern, especially via any role it plays in the cryptocurrency and digital asset markets. In other words, the algorithmic Stablecoin debacle and cryptocurrency market implosion had not retarded the case for regulating Stablecoins but reinforced and accelerated it.

In the estimation of the FSB, market developments had also reinforced the case for regulatory consistency across jurisdictions. Although by October 2022 a number of jurisdictions - notably the EU, Hong Kong, Singapore, Japan, the United States and the United Kingdom - were making concrete if uneven progress on implementation of the ten Recommendations, the FSB concern about regulatory fragmentation and arbitrage persisted.

Accordingly, the October 2022 paper included a series of revisions to the ten Recommendations designed to instil a sense of urgency (see Box). To further encourage regulators to act the FSB has promised to finalise its Recommendations for the regulation, supervision and oversight of GSCs by July 2023 and its review of the ten Recommendations by the end of 2025.

The work of the FSB is, in essence, an exhaustive application not only of the longstanding regulatory principle of "same business, same risk, same rules," but also of the need to obviate the risk of regulatory arbitrage by imposing a consistent set of standards to the regulation of Stablecoins everywhere.

But if the FSB was focused on the risks, a more positive approach was launched contemporaneously by a Working Group on Stablecoins which reported not to the G20 but to the Group of Seven (G7). It identified the potential of Stablecoins to cut the cost of cross-border, cross-currency payments.

82 https://tether.to/es/fees

83 Financial Stability Board, Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements, Consultative report, 11 October 2022, page 6.

84 Financial Stability Oversight Council (FSOC), Report on Digital Asset Financial Stability Risks and Regulation, October 2022, page 35.

85 Financial Stability Board, Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022, page 5.

86 Financial Stability Board, Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022, pages 5 and 7.

What regulators value in Stablecoins: cheaper cross-border payments

True, the reports published by the FSB do note the potential of Stablecoins to cut the cost of making cross-border payments and reduce exclusion from the financial system – these were, after all, parallel priorities of the G20 since the Saudi Arabian Presidency in 2019-20.[87]

But it was the G7 Working Group on Stablecoins that really placed the benefits of innovation and competition alongside the risks more squarely. At their meeting in Chantilly on 17-18 July 2019, the finance ministers and central bank governors of the G7 took delivery of the preliminary findings of their Working Group. In the Chairman's summary of the meeting, he not only addressed the GSC challenge directly but acknowledged that Stablecoins offered an alternative – and competitive - form of payment across national borders:

Ministers and Governors acknowledged that while innovation in the financial sector can bring substantial benefits, it can also entail risks. They agreed that Stablecoins and other various new products currently being developed, including projects with global and potentially systemic footprint such as Libra, raise serious regulatory and systemic concerns, as well as wider policy issues, which both need to be addressed before such projects can be implemented. Regarding regulatory concerns, Ministers and Governors agreed that possible "Stablecoin" initiatives and their operators would in any case need to meet the highest standards of financial regulation, especially with regards to AML/CFT, in order to guarantee they do not affect the stability of the financial system, or consumer protection. Possible regulatory gaps would also need to be addressed. Regarding systemic concerns, Ministers and Governors agreed that projects such as Libra may affect monetary sovereignty and the functioning of the international monetary system. Ministers and Governors agreed however that those projects underline the need for cross-border payment systems to be significantly improved and less costly for consumers.[88]

When the final report of the G7 Working Group on Stablecoins was published in October 2019, its focus on payments – rather than threats to financial stability – was striking. "Stablecoin initiatives have highlighted shortcomings in cross-border payments and access to transaction accounts," it read. "Depending on their design, Stablecoin arrangements may increase efficiency of payments."[89]

This was a sensible observation. The authors understood that Stablecoin payments can be made on public blockchain networks, peer-to-peer, between digital wallets in a matter of minutes without the need for a multiple card companies, intermediary banks and bank and central bank settlement systems to take many days and abstract large transaction fees to complete a payment. While transfers through frequently congested blockchain networks such as Ethereum can incur significant transaction costs ("gas fees") cryptocurrency exchanges can and do charge iterally nothing for internal transfers of Stablecoins between the digital wallets of their customers.

Although digital payments represent a threat to banks, the G7 Working Group report commendably saw addressing the risks of Stablecoins through regulation not as a means of protecting the status quo but as the key to releasing their benefits as a means of payment within a regulated environment. Indeed, the Working Group report eschewed FSB-style "High-level Recommendations" in favour of a relentlessly practical emphasis on how to make Stablecoins work. This prescription still provides a valuable guide to the essential features of a regulated Stablecoin (see Box).

87 "The pandemic has reaffirmed the need to enhance global cross-border payment arrangements to facilitate cheaper, faster, more inclusive and more transparent payment transactions, including for remittances. We endorse the G20 Roadmap to Enhance Cross-Border Payments. We ask the FSB, in coordination with international organisations and standard-setting bodies, to monitor the progress, review the roadmap and annually report to the G20." From the G20 Leaders' Declaration, Riyadh Summit, 21 November 2020.

88 Chair's Summary: G7 Finance Ministers and Central Bank Governors' Meeting, Chantilly, France, 18 July 2019.

89 G7 Working Group on Stablecoins, Investigating the impact of global stablecoins, October 2019, page 3.

G7 Working Group on Stablecoins: Its Prescription

1. *Legal certainty*: A well founded, clear and transparent legal basis in all relevant jurisdictions is a prerequisite for any Stablecoin arrangement.
2. *Sound governance*: Sound governance must be clearly established prior to live operations.
3. *Financial crime*: Public authorities will apply the highest international standards relating to virtual assets and their providers with regard to AML/CFT. The G7 will lead by example to swiftly and effectively implement the amended FATF standards relating to virtual assets.
4. *Safety and efficiency of payments*: Effective regulation and oversight of Stablecoin arrangements is critical to achieve the public policy goals of payment system safety and efficiency. Regulatory and policy frameworks are expected to remain technology-neutral and not hinder innovation, while ensuring that it is safe and robust.
5. *Cyber-security and operational risk*: Public authorities will require that operational and cyber risks from Stablecoins be mitigated through the use of appropriate systems, policies, procedures and controls.
6. *Market integrity*: A Stablecoin arrangement must ensure fair and transparent pricing in both primary and secondary markets.
7. *Data protection*: Authorities will apply appropriate data privacy and protection rules to Stablecoin operators, including how data will be used by the participants in the ecosystem and shared between the participants and/or with third parties.
8. *Consumer/investor protection*: As with any nascent technology, additional work may be required to ensure that consumers and investors are informed of all material risks as well as their individual obligations. If a Stablecoin is considered to be a security or a financial instrument, market participants must adhere to relevant capital market laws and frameworks.
9. *Tax compliance*: Stablecoin operators and users and other relevant parties are expected to comply with applicable tax laws and mitigate potential avoidance of tax obligations.
10. *Global Stablecoins*: The public policy challenges discussed are amplified if a Stablecoin reaches global scale. Additional public policy challenges arise if a Stablecoin achieves global scale.
11. *Competition*: From a competition point of view, innovation in financial services is expected to lead to enhanced user experiences and broader access to financial services. The emergence of certain GSC arrangements, however, could undermine competition in financial markets. GSCs should support competition and interoperability with other payment systems.
12. *Financial stability*: Within each GSC and its ecosystem, there may be fragilities such as credit risk, maturity and liquidity mismatch, or operational risks. It is important to look at a Stablecoin arrangement as a whole as well as at its individual components. GSCs could potentially affect financial stability by increasing fragilities in the conventional domestic currency financial sector and facilitating the cross-border transmission of shocks. A disruption to a GSC may ultimately affect the real economy in multiple countries.
13. *Monetary policy*: The impact of GSCs on monetary policy transmission will depend on the use of a Stablecoin as a means of payment, store of value and/or unit of account as well as the role of a specific currency in the stability mechanism. If a GSC was widely used as a store of value, it could weaken the effect of monetary policy on domestic interest rates and credit conditions, particularly in countries whose currencies are not part of the reserve assets. A GSC may increase cross-border capital mobility and affect monetary policy transmission. Currency substitution to GSCs may have different implications than to foreign fiat currency (classic dollarisation), given the inability to hold sovereign-to-sovereign discussions on the public policy implications of such substitution.
14. *Regulatory oversight*: Standard-setting bodies are intensifying their efforts to assess how their existing principles and standards could be applied to, and/or developing new policy recommendations for, Stablecoin arrangements.

Source: G7 Working Group on Stablecoins, Investigating the impact of global stablecoins, October 2019

The rudiments of a regulated Stablecoin

The G7 Working Group report begins with a string of questions designed to establish legal certainty for Stablecoin issuers and holders. Legal certainty is obviously essential for the predictability and enforceability of the rights and obligations of the parties to a Stablecoin issue, including the ability of holders to transfer, lend or pledge the Stablecoin. But the novelty of the instrument means no jurisdiction can provide that certainty yet.

Is a Stablecoin a form of property, a claim on the issuer, or a unique, stand-alone asset? Is a Stablecoin money or e-money or a deposit or a security or a fund or a commodity? Do holders have a claim against the issuer or the assets? What happens if the issuer becomes insolvent? If a Stablecoin relies on arbitrageurs to stabilise its value, what are the legal obligations of the arbitrageurs? How is settlement finality achieved in law? Which jurisdiction provides the governing law? What happens in conflicts of law across national borders? How should Stablecoins be taxed? What rights of recompense do holders have if unauthorised payments are made?

Though the language is coy, the report also alludes to how Stablecoin issues should be governed. Most obviously, if the reserve assets are not segregated, they can be used to reward insiders while Stablecoin holders bear any consequent losses. The vulnerability of Decentralised Autonomous Organisations (DAOs) to capture by insiders is well-documented – and DAOs, which make extensive use of algorithmic methods, are spreading from DeFi to mainstream digital services.[90]

The G7 Working Group report was an early sceptic about the reliance of algorithmic Stablecoins on arbitrageurs behaving "rationally," and on the possibility of private and public interests continuing to coincide in all circumstances. Its authors knew arbitrageurs can profit from inside information – about, say, the composition of the reserves

90 DAOs are a new type of organisation distinct from existing corporate forms such as limited liability companies (LLCs), general partnerships, cooperatives, and not-for-profit unincorporated associations. They aim to "democratise" ownership by putting token-holding user-owners in control and to reduce operational costs by programming corporate actions as smart contracts. DAOs are susceptible to manipulation by small groups of tokenholders, and their current legal status – outside a small group of American states and the Marshall Islands – is uncertain. However, they are becoming increasingly visible in mainstream retail finance. In Indonesia, for example, users of the Nanovest investment platform win NanoByte tokens that make them co-owners. In India, users of the Chingari content sharing platform earn GARI tokens for watching or creating content.

backing the Stablecoin – and make it hard for issuers to defend a currency peg.

They saw clearly the temptation of issuers to make “untruthful” assertions, even about the assets backing the Stablecoin, as some Stablecoin issuers appear to have done. They predicted runs on Stablecoins that were not transparent about the nature of the collateral they held or the credit risks the collateral represented or which failed to segregate the collateral properly from proprietary assets.

The authors of the G7 report were aware also of autonomous smart contracts that can overshoot without the brake of human intervention. They noticed that the data "Oracles" feeding algorithms can create opportunities for market abuse by delivering prices that are inaccurate, manipulated or deliberately late. They did not doubt that, once a run began, arbitrageurs would join the rout rather than resist it, precipitating those fire sales of financial assets that characterise any implosion of credit.

In short, the G7 report showed considerable foresight, for these are all possibilities which algorithmic Stablecoins have now realised. Which is why the authors of the report worried that so many Stablecoins lack clear lines of responsibility and tend to be issued by inexperienced entrepreneurs that place a lot of faith in mathematics and code.

An Article by EY

Stablecoins – the multi-faceted challenge

Like the wider cryptocurrency market, Stablecoins come in multiple forms. They are identifiable by one of four underlying collateral (or reserve) structures: fiat-backed, crypto-backed, commodity-backed, and algorithmic. Fiat-backed Stablecoins are perhaps the most common, largely due to the fact that they are not being underpinned by another cryptocurrency, which means they are backed by off-chain assets.

Fiat-backed Stablecoins are designed to hold their value on par with a fiat currency and can be used in institutional markets. Due to their prominence, these types of Stablecoins play a critical role in the tokenisation economy and the move to trading within blockchain-based rails.

However, regulatory uncertainty and scrutiny around Stablecoins has created an unpredictable environment for users, presenting a very real challenge for those looking to use these instruments.

This article will look to explore the challenge of regulating Stablecoins, aiming to understand key considerations for strengthening the guardrails around this form of value transfer.

Raising the question of regulating Stablecoins ..

As tokens are swapped on a blockchain, a mechanism is needed to transfer value. This allows investors to capitalise on benefits such as atomic settlement. Value can be transferred via a Central Bank Digital Currency (CBDC), a tokenised deposit, a tokenised liability, or a Stablecoin. These different representations of value are currently at varying degrees of development and use, and the collateral requirements and regulations governing them are also at different stages.

As more institutional use cases come to market, we are also seeing increasing user interest in details such as operational resilience, bankruptcy remoteness and the ability to access underlying collateral in Stablecoins.

Regulation comes with challenges. The end-to-end impact of Stablecoins on financial markets means that regulation must range from payment services to funds/collective investment

schemes, and include general financial services guidelines such as prudential and conduct requirements. Regulation also needs to distinguish between the Stablecoin and its issuer, in much the same way as fund regulations distinguish between the fund and the fund manager.

At a macro level, these regulations should be designed to protect both customers and the financial system from risk. The core elements of any such regulation should include:

1. **Transparency:** Stablecoin issuers must be transparent about their operations, including their reserve holdings and how they maintain the stability of their tokens. They also need to be transparent about their assets.
2. **Liquidity:** To ensure stability of their peg to fiat, Stablecoins should be backed by assets that are liquid and easily converted into fiat currency.
3. **Reserves:** Stablecoins should have adequate liquid reserves to cover redemptions. This is to ensure;
    - **Auditability:** Stablecoins and their issuers must be subject to regular audits to ensure that they are complying with the regulations.
    - **Consumer protection:** Stablecoin issuers must have in place measures to protect consumers, such as insurance and dispute resolution mechanisms.
    - **Systemic risk:** Stablecoin issuers must be subject to prudential regulation to mitigate the risks of systemic instability.

Exploring existing regulatory approaches

Learning from the current United Kingdom (UK) crypto asset consultations – where the UK Government has looked to use and amend existing regulations instead of developing a new suite of rules – the industry should look to the existing regulatory approaches to guide them as to what the regime for Stablecoins will be.

The first regulatory approach to consider is the framework behind the Constant Net Asset Value (CNAV) Money Market Fund (MMF). CNAV MMFs are required to comply with regulation on their holdings to keep their net asset value constant at one fiat currency unit. There is already regulation here – both around the MMF and around the fund manager. It requires transparency of holdings, liquidity of underlying assets, sufficiency of reserves both at the fund level and at the fund manager level, consumer protection through country investor protection schemes, auditability of the fund and fund manager, and fund manager compliance with prudential regulation. There is also bankruptcy remoteness in that the fund is separate from the fund manager and its assets are segregated.

Applying regulation from CNAV MMFs to fiat-backed Stablecoins does not require a huge leap. That said, there are differences to consider. For example, firms can only purchase units in a CNAV MMF via distributors that perform Anti-Money Laundering (AML)/Know Your Client (KYC) checks.

Conversely, Stablecoins may be transferred between holders directly from wallet to wallet without any involvement by the issuer. It is such differences that bring their own challenges when it comes to customer protection and bankruptcy cover, as well as anonymity.

Another regulatory approach to consider is that of Scottish and Northern Irish bank notes. This regulation requires the six banks that issue Scottish and Northern Irish bank notes to set aside cash assets that are worth at least the value of all of the banknotes they have in circulation. These bank notes are fully transferable and their use is anonymous. This is an approach being considered by some countries; however, it may be better suited to CBDCs than Stablecoins.

Being aware of macroprudential implications

The Bank for International Settlements (BIS) and the International Monetary Fund (IMF) have written extensively about the macroprudential implications of Stablecoins. Within the analysis is the potential for Stablecoins to replace local currencies during periods of hyper-inflation, and the impact this would have on the availability of liquid collateral if these were required to perform as assets to back Stablecoins. The risks need considerable thought, not least as many countries are currently still grappling with more basic regulatory challenges, and there are risks to macroprudential stability.

Considering different means of value transfer

There are a number of means to achieving value transfer that are being prototyped, all with profiles that impact the exposure of users to different risks and in different magnitudes. Any regulation of Stablecoins should consider the comparison with – and read across to – value transfer, as regulation can have the impact of unintentionally promoting one approach over another without being cognisant of wider consequences.

Overall, regulating Stablecoins comes with unique challenges. There are a number of existing approaches the industry must consider to move the discussion forward and understand the risks and considerations.

As we move towards a new trading world, what we know is that there is need for some form of value transfer. Stablecoins will form part of an ecosystem that includes both traditional means of value transfer and monetary innovations. Firms must consider the actions they can take now to better understand the evolving landscape and the implications this may have on their operations and markets as regulation evolves.

Visit blockchain.ey.com for more information on this topic, or to sign up for EY's upcoming Global Blockchain Summit.

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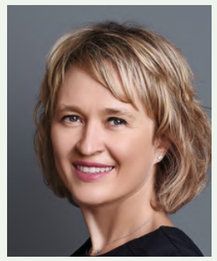

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Applying the PFMIs to Stablecoins

The litany of risks posed by Stablecoins drawn up by the authors of the G7 report explains why they shared the opinion of the authors of the FSB reports that any Stablecoin which attains scale in facilitating payments by individuals and firms must comply with the Principles for Financial Market Infrastructures (PFMIs), published by the Committee on Payments and Market Infrastructures (CPMI) and the International Organisation of Securities Commissions (IOSCO).[91]

These 24 principles, first published over a decade ago, oblige financial market infrastructures of all kinds – including, most importantly in the case of Stablecoins, payments market infrastructures (PMIs) such as the Real Time Gross Settlement (RTGS) systems managed by central banks and the Automated Clearing Houses (ACHs) managed by commercial banks – to, inter alia, manage the credit, collateral, liquidity and operational risks they incur; achieve settlement finality; protect customer assets and data; and adopt and use industry standards.

Following a consultation on an initial report published in October 2021,[92] the CPMI and IOSCO in July 2022 published guidance on the application of the PFMIs to Stablecoins judged to be or likely to become systemically important payments infrastructures, predominantly because they are used for making payments at scale.[93]

91 The Committee on Payments and Market Infrastructures (CPMI) and the Technical Committee of the International Organisation of Securities Commissions (IOSCO), Principles for Financial Market Infrastructures (PFMIs), April 2012.

92 The Committee on Payments and Market Infrastructures (CPMI) and Board of the International Organisation of Securities Commissions (IOSCO), Application of the Principles for Financial Market Infrastructures to Stablecoin Arrangements: Consultative Report, October 2021.

93 The Financial Stability Board (FSB) and CPMI-IOSCO have a broadly common set of criteria for judging whether a Stablecoin is systemically important. They include the number and type of users; the number, type (wholesale or retail, government or private, domestic or cross-border, investments or payments) and value of transactions; the degree of inter-connectedness with the real economy, the traditional financial system and other digital networks; the business, structural and operational complexity; and substitutability (whether there are readily available alternatives to using the Stablecoin to make payments). See Annex 3 in Financial Stability Board, Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements: Consultative report, 11 October 2022 and pages 11-12 in The Committee on Payments and Market Infrastructures (CPMI) and Board of the International Organisation of Securities Commissions (IOSCO), Application of the Principles for Financial Market Infrastructures to Stablecoin Arrangements, July 2022.

CPMI-IOSCO Guidance on the Application of the PFMI to Stablecoins

Principle	Guidance
Principle 2 **(Governance)**	A systemically important Stablecoin should have appropriate governance arrangements. When seeking to observe Principle 2, a systemically important Stablecoin should consider how: • the Stablecoin's ownership structure and operation allow for clear and direct lines of responsibility and accountability, for instance, it is owned and operated by one or more identifiable and responsible legal entities that are ultimately controlled by natural persons; • the Stablecoin's governance allows for timely human intervention, as and when needed, in order to observe Principle 2 and the other relevant principles of the PFMI on a continuous basis; and • the Stablecoin's ownership structure and operation allow the Stablecoin to observe Principle 2 and the other relevant principles of the PFMI irrespective of the governance arrangements of other interdependent functions.
Principle 3 **(Comprehensive risk management)**	A systemically important Stablecoin should regularly review the material risks that the FMI function bears from and poses to other Stablecoin functions and the entities (such as other FMIs, settlement banks, liquidity providers, validating node operators and other node operators, or service providers) which perform other Stablecoin functions or on which the Stablecoin relies for its transfer function. A systemically important Stablecoin should develop appropriate risk-management frameworks and tools to address these risks. In particular, it should identify and implement appropriate mitigations, taking an integrated and comprehensive view of its risks.
Principle 8 **(Settlement finality)**	A systemically important Stablecoin should provide clear and certain final settlement, at a minimum by the end of the value date, regardless of the operational settlement method used. Where necessary or preferable, such settlement should be provided on an intraday or real-time basis. When seeking to observe Principle 8, a systemically important Stablecoin should: • clearly define the point at which a transfer of a Stablecoin through the operational method used becomes irrevocable and unconditional; • ensure that there is a clear legal basis that acknowledges and supports finality of a transfer; and • have robust mechanism(s) for preventing any misalignment between the state of the ledger and legal finality and ensure that legal finality of a transfer, once it has occurred, is maintained regardless of competing state(s) of the ledger.
Principle 9 **(Money settlements)**	A Stablecoin used by a systemically important Stablecoin for money settlements should have little or no credit or liquidity risk. In assessing the risk presented by the Stablecoin, the Stablecoin should consider whether the Stablecoin provides its holders with a direct legal claim on the issuer and/or claim on, title to or interest in the underlying reserve assets for timely convertibility at par into other liquid assets such as claims on a central bank, and a clear and robust process for fulfilling holders' claims in both normal and stressed times. When seeking to observe Principle 9, a systemically important Stablecoin should determine whether the credit and liquidity risks of the Stablecoin that it uses for money settlements are minimised and strictly controlled and the Stablecoin is an acceptable alternative to the use of central bank money. Relevant factors may include but are not limited to: • The clarity and enforceability of the legal claims, titles, interests and other rights and protections accorded to holders of the Stablecoin and SA [Stablecoin Arrangement] participants in relation to the issuer of a Stablecoin and reserve assets backing it, including their treatment (e.g., seniority) in the event of insolvency of the issuer, its reserve manager or a custodian of the reserve assets and/or other protections such as third party guarantees. • The nature and sufficiency of the Stablecoin's reserve assets to support and stabilise the value of the outstanding stock of issued Stablecoins, and the degree to which the Stablecoin's reserve assets could be liquidated at or close to prevailing market prices. • The clarity, robustness and timeliness of the process for converting the Stablecoin into other liquid assets such as claims on a central bank in both normal and stressed circumstances. The Stablecoin should be convertible into other liquid assets, as soon as possible, at a minimum by the end of the day and ideally intraday. • The creditworthiness, capitalisation, access to liquidity and operational reliability of the issuer of the Stablecoin, provider of the settlement accounts and custodian(s) of the reserve assets. Reserve assets held or placed in custody should be protected against claims of a custodian's creditors. Any chosen custodians should have robust accounting practices, safekeeping procedures and internal controls to protect the assets, as well as a sound legal basis supporting its activities, including the segregation of assets. • The sufficiency of the regulatory and supervisory framework that applies to the issuer, reserve manager(s) and/or custodian(s) of the reserve assets. • The existence of risk controls that could, where needed, reduce credit and/or liquidity risks. Possible examples include collateral pools supporting committed lines of credit, third party guarantees and procedures for allocating losses arising from a default by the issuer or a decrease in value of the Stablecoin.

Source: The Committee on Payments and Market Infrastructures (CPMI) and Board of the International Organisation of Securities Commissions (IOSCO), Application of the Principles for Financial Market Infrastructures to Stablecoin Arrangements, July 2022.

Although the CPMI-IOSCO report creates no new principles for Stablecoins, and assumes only that all existing PFMIs will apply, it does adapt them to take account of the fact that Stablecoins are neither central nor commercial bank money; may not be soundly governed; and, because they rely on blockchain technologies that make use of consensus mechanisms and smart contracts and favour "atomic" settlement, may create a disjunction between technical settlement of a payment and legal settlement finality.

Accordingly, the guidance offered by CPMI-IOSCO includes detailed advice on how regulators should approach governance (PFMI Principle 2), the management of risks (Principle 3), settlement finality (Principle 8) and money settlements (Principle 9). It is summarised in the table.

Progress towards compliance with the PFMIs is clearly slow. In February 2023 the chairman of the FSB told the G20 that existing Stablecoins did not meet the standards set by the PFMIs.[94] But adding the PFMIs to the list of obligations Stablecoins must meet is entirely consistent with the "same activity, same risk, same regulation" principle that international regulators have pursued since the emergence of Libra in 2019 first alerted them to the risks posed by Stablecoins.

In other words, international regulators have pursued for four years a consistent policy aimed at regulating Stablecoin issuers in the same way as traditional financial institutions. Indeed, the PFMIs are just one set of standards among several that international regulators want to apply to Stablecoins. Others include the capital treatment of cryptocurrencies held by banks (See Capital treatment of Stablecoin issuers and Capital treatment of Stablecoins at Banks below) and the FATF financial crime recommendations.

Indeed, the standards that regulators are expected to apply to Stablecoins now include those issued by the International Organisation for Standardisation (ISO), the International Electrotechnical Commission (IEC) and the Framework published by the US National Institute for Standards and Technology (NIST) to manage cyber-security risks such as hacks and denial of service and ransomware attacks.

Although the G7 Working Group report was positive about the resilience of blockchain technology to cyber-attacks by comparison with orthodox technologies, its authors were under no illusions about the ability of blockchain to match the speed and scalability of existing PMIs. "The use of multiple synchronised ledgers and multiple processing nodes could be a limitation when it comes to ensuring real-time processing of transactions on a distributed ledger," it noted.

And the attitude of the G7

94 Letter from FSB chairman Klaas Knot to G20 Finance Ministers and Central Bank Governors, 20 February 2023, page 2.

Working Group to data protection is bound to intrigue anyone of a cynical disposition. Regulators knew privacy was the chief vulnerability of the Libra issuer (Facebook) and insisting Stablecoins adhereto the highest standards of data protection rapidly became common to all official discussions of the subject. This high-minded approach cannot conceal the fact that government alternatives to Stablecoins present an even graver threat to privacy than Facebook.

Why the regulators singled out Libra

But if there was any doubt that the target of the regulators was Libra, the G7 Working Group dispelled it by noting the power of the technology giants in payments derives[95] from network effects as well as data mining:

Large technology firms (`big techs') such as Alibaba, Amazon, Apple, Facebook, Google and Tencent have increasingly moved into payments. These big techs draw on their unique combinations of large amounts of customer data, platform network effects and diversified activities to offer new modes of delivery of payment services or new payments features at relatively low cost. This Data-Network-Activity (`DNA') business model inherent in big techs could give them an advantage in payment services.[96]

The G7 Working Group report insisted that all the risks its main body of work identified were amplified once a Stablecoin reached the global scale. Accordingly, the remedies it proposed should be applied a fortiori. And no Stablecoin, concluded the report, should be allowed to grow so large and powerful that it suppressed competition.

The hostility of the regulators – and especially of the Federal Reserve in the United States – was enough to sink Libra.[97] It first detached the other corporate members of the Libra foundation. It then forced a re-branding (from Libra to Diem), a shrinkage of coverage from multiple currencies to the US dollar only, a relocation from Switzerland to the United States and an eventual sale to the state-chartered digital asset bank Silvergate in January 2022. In March 2023, Silvergate Bank announced that it intended to wind down its operations and liquidate the bank, putting a final end to the threat.[98]

American regulators had delivered the coup de grace to Diem 15 months earlier in their November 2021 report on Stablecoins, which called for legislation to address "concerns about systemic risk and concentration of economic power" and for "restrictions that limit affiliation with commercial entities."[99] In other words, the regulatory problem with Diem was not that it was a

95 Chiefly Facebook (now Meta), Amazon, Apple, Microsoft, Netflix, and Google (now Alphabet) but also the Chinese social media platforms Alibaba and Tencent.

96 G7 Working Group on Stablecoins, Investigating the impact of global stablecoins, October 2019, page 28.

97 The Libra foundation was actually based in Switzerland, where it was regulated by the Swiss Financial Market Supervisory Authority (FINMA) but American regulators were decisive in making the project unviable.

98 Silvergate Capital Corporation Announces Intent to Wind Down Operations and Voluntarily Liquidate Silvergate Bank, press release, 8 March 2023.

99 President's Working Group on Financial Markets, Report on Stablecoins, November 2021, page 3.

Stablecoin, but that it was affiliated with Facebook.

Reportedly, this came as a surprise to the management of Diem[100] – after all, they could see plenty of other US dollar-pegged Stablecoins were in the market already - but in the very year that the project began the G7 Working Group report was quite candid about the threat a [Data Network Activity] DNA-owned Stablecoin posed to the monetary sovereignty of nations.

It warned that a successful global Stablecoin might not only rob governments of seigniorage revenue from issuing fiat currency but of capital altogether. A global Stablecoin, it warned, "may serve as a highway for capital outflows" which the principal lever of monetary policy – the rate of interest – is powerless to avert.

Although such an outcome would scarcely be novel - plenty of economies have succumbed to "dollarisation" - the particular difficulty with "dollarisation" by a global Stablecoin is that there is no central bank for the aggrieved national central bank or government to discuss the problem with.

A successful global Stablecoin could even displace the US dollar in global trade, and force central banks to hold it in their reserves. Which is why the American regulators were hostile to Libra/Diem and why the governments that were earliest to regulate Stablecoins have insisted that the collateral they hold be domestic only.[101]

After all, the principal threat a Stablecoin poses to financial stability is to undermine the funding of established banks by luring their deposits away. This would increase bank dependence on wholesale sources of funding, whose own capacity to provide banks with liquidity would also be reduced by Stablecoins buying treasury bills, commercial paper and repos for their reserves.[102]

If banks could not fund themselves, it would undermine their ability to lend to the wider economy, especially if they did not introduce Stablecoins of their own. This threat – of banks losing their funding and so their ability to lend – has become, ironically enough, a powerful argument against the obvious central bank counter to successful Stablecoins: Central Bank Digital Currencies (CBDCs).

100 See Hannah Murphy and Kiran Stacey, Facebook Libra: the inside story of how the company's cryptocurrency dream died, Financial Times, 10 March 2022

101 If a US dollar Stablecoin must be backed by US dollar bank deposits, treasury bills and bonds, the US dollar interest rate will not be powerless to influence monetary conditions. See the action taken by the Japanese government to ensure Yen Stablecoins are backed by Yen-denominated assets held in Japan on page [52] below.

102 A successful Stablecoin could even create shortages of the High-Quality Liquid Assets (HQLAs) that capital adequacy regulations insist banks hold to manage their liquidity. This would complicate the ability of banks to comply with liquidity ratio requirements and blunt the ability of central banks to manage monetary conditions through open market operations (repo and reverse repo).

Central Bank Digital Currencies (CBDCs) as a response to Stablecoins

Central banks have pondered the implications of digital technology for their role in money issuance and payments since the advent of the Internet in the mid-1990s, following the success of the first online payments in 1994.[103] But by 2019 the threat of a successful global Stablecoin in the shape of Libra added urgency to the discussion about "digital money" within central banks.

Introducing CBDCs was the obvious way to eliminate the threat of Stablecoins. After all, banks, businesses and consumers were bound to prefer to pay each other in fiat currency central bank money rather than via a commercial bank money Stablecoin backed by fiat currency assets.

Consumer and business preference is why many observers believe a CBDC would provide a superior solution to the problem Stablecoins were set up to solve: the lack of fiat currency in digital form on blockchain networks. If US dollars, euros, pounds Sterling, Japanese Yen and Swiss Francs were available on those networks to settle cryptocurrency and digital asset transactions, the case for Stablecoins is much harder to sustain.

By May 2020, central banks in 35 countries were considering a CBDC. According to the Atlantic Council CBDC Tracker, 108 countries are now exploring a CBDC. Of these, four have actually launched one; 18 have a pilot scheme in train; 32 are at the development stage; 39 are at the research stage; and 15 are inactive. Just two CBDC programmes have been cancelled.[104]

103 See Bank for International Settlements, Implications for Central Banks of the Development of Electronic Money, October 1996. This report raised issues familiar in the recent discussions about Stablecoins and CBDCs, such as whether issuance should be confined to banks, the risks of money laundering and cyber-attacks, the potential loss of seigniorage revenues and especially the impact on central bank balance sheets, where the paper argued that the obvious solution was "for central banks to consider issuing e-money value themselves, though this could limit competition and reduce incentives to innovate" (page 10). In the United States, e-money institutions are regulated at the State level, which is why State regulators have proved so important in the regulation of a variety of digital payments and digital asset exchanges and custodians in recent years. "E-money" regulations followed in the European Union (EU via the Electronic Money Directive of 2009. The e-money regulations issued in the United Kingdom in 2011 were derived from the EU Directive.

104 https://www.atlanticcouncil.org/cbdctracker/. The Council actually lists 115 countries with live CBDC projects at various stages of development but counts the Eastern Caribbean currency union as eight separate countries.

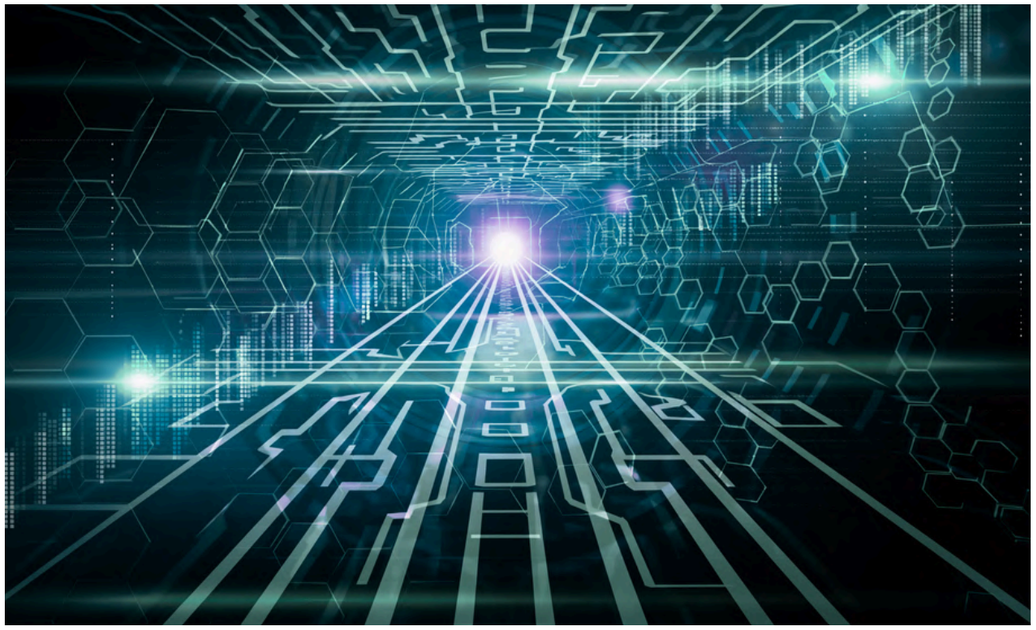
For users, CBDCs are attractive for the same reasons as Stablecoins, but have advantages of their own. They could, for example, reduce the cost of issuing, storing and transporting physical cash. Early CBDC issuances (such as those in the Bahamas and the Eastern Caribbean) have also emphasised the benefits in terms of financial inclusion.

Inclusion means the incorporation into the financial system of citizens that lack a bank account but almost always own a mobile telephone. Despite an increase in possession of bank accounts during the global pandemic of 2020-2022, when contactless digital payments became essential, the World Bank estimates that 1.4 billion people – mainly women, poorer and less educated people living in rural areas – lack access to financial services.[105]

Digital banking, delivered via Internet-linked mobile telephones or computers, is an obvious solution, though it requires an expansion of Internet and broadband access, especially in less developed countries.[106] Stablecoins are already playing a role in this area, but the earliest CBDCs have adopted the financial inclusion rationale explicitly.

Like Stablecoins, CBDCs could make cross-border payments cheaper. Experiments conducted by central banks and commercial firms have proved that CBDCs can cut costs, increase speed and improve the transparency of cross-border payments as well as widen access to cross-border payment services (see Box). Which suggests CBDCs ought to have political support, since these are precisely the goals the G20 has set for the reform of cross-border payments.

But making cross-border payment cheaper is not central to the case for CBDCs, not least because of the difficulties of linking national CBDC systems. As the Bank of England put it in a consultation paper on the case for a retail CBDC, "while enhancing cross-border payments is not a primary motivation for the digital pound, we would work closely with other countries to ensure that its design did not introduce unintended barriers to payments with other currencies and, in so far as other countries issue their own CBDC, would offer the potential for interlinking."[107]



CBDC Cross-Border Payments Experiments by Central Banks

Project Dunbar (the Reserve Bank of Australia, Bank Negara Malaysia, the Monetary Authority of Singapore, the South African Reserve Bank and the Bank for International Settlements Innovation Hub) has developed prototypes for a shared platform that allows banks to settle cross-currency transactions using CBDCs without correspondent banks while solving three obstacles: non-resident banks' access to CBDCs; the need to adhere to local regulations; and the need to find a single governance regime for a multi-jurisdictional service.

Phase 1 of **Project Helvetia** (the BIS Innovation Hub, the Swiss National Bank (SNB) and the financial infrastructure operator SIX) showed that a wholesale CBDC can be used to settle tokenised securities in central bank money in one country (Switzerland) and currency (CHF) while phase 2 (where five commercial banks were added) proved a wholesale CBDC can be integrated with existing bank and central bank systems.

Project Icebreaker (BIS Innovation Hub, Bank of Israel, Norges Bank, Sveriges Riksbank) proved CBDCs can be used to make retail payments (including remittances) across borders.

Project Jura (the Banque de France, the BIS Innovation Hub Swiss Centre, the Swiss National Bank and a private sector consortium) showed it is possible to settle tokenised securities atomically cross-border and cross-currency (euros and CHF) in central bank money using CBDCs within existing regulatory frameworks and without linking multiple platforms or using intermediaries and without central banks losing control of their national currency.

Project Mariana (BIS Innovation Hub, Bank of France, Monetary Authority of Singapore, the Swiss National Bank) aims to prove CBDCs can be used to settle FX transactions matched on-chain by automated market maker (AMM) smart contracts.

Project mBridge (BIS Innovation Hub, Hong Kong Monetary Authority, Bank of Thailand, People's Bank of China, Central Bank of the United Arab Emirates) proved CBDCs can be used on a central bank-operated blockchain network to settle payments and FX peer-to-peer in real-time across national borders.

105 Globally, digitisation of financial services has raised the proportion of adults with a bank account to 76 per cent of adults, up from 51 per cent a decade ago. See World Bank, COVID-19 Boosted the Adoption of Digital Financial Services, 21 July 2022.

106 World Bank data estimates Internet access at 89 per cent in high-income countries, but only 19 per cent in low-income countries. Penetration is 29 per cent in Sub-Saharan Africa and 39 per cent in South Asia and Pacific island states. https://data.worldbank.org/indicator/IT.NET.USER.ZS

107 Bank of England and HM Treasury, The digital pound: a new form of money for households and businesses?, Consultation Paper, February 2023, page 36.

Stablecoins, on the other hand, could play a more immediate role in making cross-border payments cheaper – and there are good reasons why international regulators are prepared to encourage them in that role.

The cost of cross-border payments is a tax on world trade at a time when digital technology and international migration is vastly increasing the flows of money across national borders. The value of cross-border payments totalled US$156 trillion in 2022. Payments between businesses worth a substantial proportion of this figure (US$34 trillion) can still take several days, with six out of ten requiring manual intervention.[108]

But it is the cost of international remittances that provided the spur for the G20 to make cross-border payments a priority. Remittances can take up to ten days to clear and devour more than a tenth of the value of the transfer.[109] Efforts to address this earlier had made little progress. As long ago as 2015 the United Nations had set twin targets of reducing the transaction costs of remittances to less than 3 per cent and eliminating any payments methods that eat more than 5 per cent of the value.[110]

So it is not surprising that remittances were an area that Facebook (now Meta) identified as a use-case for its Libra Stablecoin. Novi, the digital wallet for Libra (later Diem), launched a pilot programme in partnership with Coinbase, the cryptocurrency exchange, in which users in the United States could send up to US$1,000 to Guatemala from a digital wallet using the Pax Dollar Stablecoin, via WhatsApp.[111] The Novi digital wallet was closed in July 2022.

But the high transaction costs on which the Novi proposition was based were already a priority for the G20, which charged the FSB with assessing how cross-border payments work at present and identifying a set of "building blocks" to replace the status quo with a better system.

An initial FSB report to the G20 in April 2020 warned that "recent private sector proposals to create so-called `Stablecoins' for payment purposes have highlighted the possibility of new digital payments gaining scale quickly, potentially globally".[112] Libra was the principal target of this concern but regulators had also noticed that cryptocurrency exchanges were enabling cross-border payments to be made in cryptocurrency between digital wallets via telephone apps. They would have faced no difficulty in extending the service to Stablecoins.[113]

The FSB delegated the task of addressing this looming challenge to the CPMI, which came up with 19 of the "building blocks" requested by the G20. Surprisingly, just one "building block" addressed each of Stablecoins ("Fostering appropriate risk management within global Stablecoin arrangements, and sound legal underpinning, as a basis for the use of Stablecoins in multiple jurisdictions") and CBDCs ("Providing domestic CBDC implementations with the necessary guidance to enable cross-border transactions via access by non-residents and/or interlinking with international infrastructure"). The rationale was that both are "exploratory" and "on a longer trajectory."[114]

One long trajectory exploration was published by the BIS a few months later. It proposed replacing networks of domestic banks monopolising access to local payments market infrastructures on behalf of foreign banks – the traditional correspondent banking networks - with inter-operating CBDCs.[115]

A private sector venture, Fnality Global Payments, has proposed a blockchain-based variant of this model that links domestic payments systems.[116] Interestingly, it grew out of an earlier project to provide tokenised assets trading on blockchain networks with a digital cash payment asset in major currencies that could be used on the networks: the Utility Settlement Coin (USC). The USC was not a Stablecoin but a payment token based on committed pools of central bank money deposits in each currency, which could be used to settle transactions in tokenised assets, token-versus-payment token.

Stablecoins have - in the absence of on-chain fiat currency in the form of a CBDC - overtaken payment tokens as a form of cash useable in the settlement of tokenised transactions, but USC prefigured many of the regulatory anxieties about Stablecoins. Regulators asked which entity holders of USC could make a claim against. They also fretted about loss of control of the domestic currency, particularly in cross-border payments.

108 Victoria Cleland, Speech, Rowing in Unison to Enhance Cross-Border Payments, 29 June 2022.

109 Victoria Cleland, Speech, Rowing in Unison to Enhance Cross-Border Payments, 29 June 2022.

110 https://www.un.org/en/observances/remittances-day/background

111 International Monetary Fund, FinTech Notes, Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements by Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto, Note/2022/008, September 2022, page 19.

112 Financial Stability Board, Enhancing Cross-border Payments, Stage 1 report to the G20, 9 April 2020, page 2.

113 See Coinbase, "There's now a cheaper, easier way for your friends and family in Mexico to cash out the crypto you send them," 15 February 2022.

114 Committee on Payments and Market Infrastructures (CPMI), Enhancing cross-border payments: building blocks of a global roadmap, Stage 2 report to the G20, July 2020, pages 7 and 4.

115 Bank for International Settlements (BIS), Paper No 115, Multi-CBDC arrangements and the future of cross-border payments, March 2021.

116 Fnality Global Payments, Enhancing the safety and efficiency of cross-border interbank payments: an overview, December 2020.

How Stablecoins are being regulated: Japan

Those concerns have not disappeared, which is the primary reason why Stablecoins are now being brought within the regulatory perimeter in all the major jurisdictions. The work of the FSB on behalf of the G20 (especially its "same business, same risk, same rules" dictum) and the G7 Working Group on Stablecoins have provided regulators – and legislators, where necessary - with a common template.

In June 2022 Japan became the first major economy to adopt a regulatory framework for Stablecoins,[117] via an amendment to the Payment Services Act, and its structure was clearly based on the FSB report of October 2020 as amended.[118] Most importantly, the Japanese government has given regulated domestic banks, transfer agents and trust banks only the right to issue Stablecoins. Stablecoins issued outside Japan are effectively excluded by a requirement that they be backed by assets held in Japan.

Algorithmic Stablecoins are excluded altogether from the regulation and will continue to be regulated under a different framework that applies to crypto-asset exchanges and dealers in security tokens. Intermediaries engaged in the management and exchange of Stablecoins (such as digital asset custodians) are also regulated in Japan for the first time. The amendment is expected to come into force in June 2023.

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117 There are Yen-denominated Stablecoins – GMO issued the first regulated one. See https://stablecoin.z.com/

118 Clifford Chance, Japan to have world's first clear regulatory framework for Stablecoins, June 2022.

How Stablecoins are being regulated: United States

In the United States, the November 2021 report on Stablecoins by the US President's Working Group on Financial Markets advocated prompt legislation to bring Stablecoins within the federal regulatory perimeter.[119] As in Japan, the report recommended that issuance of Stablecoins be restricted to regulated banks and that intermediary service providers be supervised at the federal level.[120]

The report of the President's Working Group was followed by an executive order issued by President Joe Biden on 9 March 2022. It focused largely on investigating the case for and against a US dollar CBDC and making recommendations for change but emphasised the need to ensure digital assets in general (including Stablecoins) did not hurt consumers, threaten financial stability or facilitate crime. The unstated corollary is that respectable Stablecoins must be issued by regulated banks.[121]

The executive order required a number of federal agencies to develop policy recommendations to put the ambitions of the order into practice, and 20 separate reports are expected in total. Of those delivered so far,[122] two have major implications for the regulation of Stablecoins in the United States.

The first is the report of the Financial Stability Oversight Council (FSOC), which was given added urgency by the Terra/LUNA collapse of May

119 President's Working Group on Financial Markets, the Federal Deposit Insurance Corporation and the Office of the Comptroller of the Currency, Report on Stablecoins, November 2021.

120 Most digital asset custodians in the United States are regulated by state-based regulators under money transmission and virtual currency laws and regulations. The most popular choice is the New York State Department of Financial Services (NYDFS).

121 Executive Order on Ensuring Responsible Development of Digital Assets, The White House, 9 March 2022.

122 The White House Office of Science and Technology Policy has issued three reports (a technical evaluation of the case for a US dollar CBDC, a paper on the policy objectives of a CBDC and a third on the energy implications of crypto-assets); the Department of the Treasury three reports (on the future of money and payments, the implications of crypto-assets for consumers, investors and businesses and a third on the illicit financing risks of digital assets); the Department of Justice one (on law enforcement in cases of crime associated with digital assets); the Department of Commerce one (on how digital assets can enhance American competitiveness) and the Financial Stability Oversight Council one (on management of risks to financial stability posed by digital assets).

2022, just eight weeks after the executive order was issued. The FSOC report of October 2022 devoted six pages to an analysis of the collapse of the Terra Stablecoin as an illustration of "important vulnerabilities inside the crypto-asset ecosystem."[123]

The Securities and Exchange Commission (SEC) has since adopted a less academic approach to the same debacle. On 16 February 2023 it charged Singapore-based Terraform Labs PTE Ltd and Do Hyeong Kwon with orchestrating a multi-billion-dollar crypto asset securities fraud involving an algorithmic Stablecoin and other crypto asset securities.[124]

"We allege that Terraform and Do Kwon failed to provide the public with full, fair, and truthful disclosure as required for a host of crypto asset securities, most notably for LUNA and Terra USD," said SEC Chairman Gary Gensler. "We also allege that they committed fraud by repeating false and misleading statements to build trust before causing devastating losses for investors." [125]

For the FSOC, on the other hand, asset-backed Stablecoins are even more dangerous than algorithmic Stablecoins as a conduit of risk from the cryptocurrency markets to the traditional financial markets. That is partly because the reserves of asset-backed Stablecoins consist of traditional financial assets (including money market funds) that are susceptible to funding mismatches and "runs" and partly because Stablecoins could become a widely used means of payment.[126]

This challenge to the security of the existing payments system is the chief concern of the other agency paper that matters to Stablecoins, issued by the US Department of the Treasury. In *The Future of Money and Payments*, the Treasury Department frets that "Stablecoins aspire to be a new type of money supported by a novel payments technology, with implications for the payment system that are more difficult to predict."[127]

The worry is that, if Stablecoins escape their current niche in cryptocurrency speculation to become a form of payment used by households and businesses, including across national borders, it will add new risks to the credit, liquidity, cyber-security and operational risks associated with conventional payments systems.

The new risks identified by the Treasury Department include regulatory arbitrage, settlement congestion, increased criminal activity by money launderers, terrorists, sanctioned states and freelance individuals exploiting software bugs, breaches of privacy, reductions in the amount of credit available to the economy, and old-fashioned "runs" that spill over into traditional markets.

The Treasury paper suggests – in line with the original executive order - that the risks be addressed by legislation to establish a federal framework for regulation of non-bank issuers of money-like instruments and providers of payment services, a definition that clearly encompasses Stablecoin issuers.

A federal system will supplement the current reliance on State-level regulators[128] such as the NYDFS, which has developed a major role in licensing digital asset intermediaries such as exchanges and custodians, based chiefly on its historic role as a regulator of e-money institutions.[129]

123 Financial Stability Oversight Council (FSOC), Report on Digital Assets Financial Stability Risk and Regulation 2022, Box C, pages 48-53.

124 Securities and Exchange Commission, SEC Charges Terraform and CEO Do Kwon with Defrauding Investors in Crypto Schemes, press release, 16 February 2023. The South Korean government has issued an arrest warrant for Do Kwan (and five other individuals) for breaches of South Korean capital markets laws. Do Kwan was arrested in Montenegro on 23 March 2023.

125 Securities and Exchange Commission, SEC Charges Terraform and CEO Do Kwon with Defrauding Investors in Crypto Schemes, press release, 16 February 2023.

126 Financial Stability Oversight Council (FSOC), Report on Digital Assets Financial Stability Risk and Regulation 2022, pages 15-16.

127 US Department of the Treasury, The Future of Money and Payments: Report Pursuant to Section 4(b) of Executive Order 14067, September 2022, page 2.

128 US Department of the Treasury, The Future of Money and Payments: Report Pursuant to Section 4(b) of Executive Order 14067, September 2022, page 48.

129 Coinbase, for example, has had an e-money licence from the NYDFS since January 2017, and a digital asset custodian licence from the NYDFS since October 2018.

In the meantime, the NYDFS has continued to expand its role. On 8 June 2022 it became the first State regulator to publish guidance of its own on Stablecoins.[130] Under it, US dollar Stablecoins issued by entities regulated by the NYDFS must be fully backed by reserve assets that keep market and nominal values aligned and which are segregated and held at regulated banks. The NYDFS guidance also insists reserve assets be restricted to cash and Treasury bills, excluding commercial paper.[131] It also recommends a fair and efficient redemption process[132] and an independent audit of the issuer.

The FSOC report is clear, taking its lead from the original executive order, that it prefers a higher degree of co-ordination between the federal and State regulators supervising Stablecoin issuers. Warning that "Stablecoin issuers may be engaging in regulatory arbitrage,"[133] the FSOC recommends federal legislation to create a comprehensive regulatory framework for Stablecoins, covering market integrity, investor and consumer protection and payment system and financial stability risks.[134]

130 Adrienne A. Harris, Superintendent of Financial Services, Guidance on the Issuance of U.S. Dollar-Backed Stablecoins, 8 June 2022

131 See page 50 above. Tether announced on 13 October 2022 that it had eliminated commercial paper from its reserves.

132 See "Unequal Redemption Rights," page 72.

133 Financial Stability Oversight Council (FSOC), Report on Digital Assets Financial Stability Risk and Regulation 2022, page 115. The report exhibits concern about the lack of a consistent, comprehensive regulatory framework for Stablecoins capable of averting regulatory arbitrage. It notes the involvement of the Federal Reserve, the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency (OCC), the National Credit Union Administration (NCUA), the Securities and Exchange Commission (SEC), the Commodity Futures Trading Commission (CFTC) and state banking regulators, notably the New York Department of Financial Services (NYDFS), which has since June 2022 specified the type of reserve assets Stablecoin issuers can buy and laid down disclosure, redemption and liquidity management requirements. The FSOC notes some Stablecoin issuers have State-level Money Service Business (MSB) licences and are registered with the Financial Crimes Enforcement Network (FinCEN) as MSBs, even though licences aimed at preventing financial crime are not appropriate, while others have State-level licences or are seeking bank charters.

134 Financial Stability Oversight Council (FSOC), Report on Digital Assets Financial Stability Risk and Regulation 2022, page 117.

How Stablecoins are being regulated: European Union

It remains to be seen whether and when the proposed legislation will be introduced and implemented in the United States, but in the EU legislation governing Stablecoins is expected to come partially into force in July 2023, with major provisions following 12-18 months later. The Markets in Crypto-assets (MiCA) Regulation should be fully in force by the third quarter of 2024.

With MiCA, EU legislators are following the same path on Stablecoins as their counterparts in Japan and the United States. The new law specifies that Stablecoins backed by an EU currency can be issued by banks, authorised e-money institutions and State-owned financial institutions only. Issuance of asset-backed Stablecoins is restricted to banks and token issuers regulated under MiCA.

As elsewhere, algorithmic Stablecoins are outside the scope of MiCA altogether. In addition, all Stablecoin issuers must be based in the EU and submit to supervision by the European Banking Authority (EBA). Their operation, organisation and governance will be regulated and they will be obliged to maintain – and be shown to maintain, by disclosure requirements – that they hold sufficiently liquid reserves to meet the claims of holders at any time.

How Stablecoins are being regulated: United Kingdom

The government of the United Kingdom has also embarked already on legislation to govern Stablecoins. Following a public consultation on a paper issued in January 2021,[135] the government promised in April 2022 to "take the necessary legislative steps to bring activities that issue or facilitate the use of Stablecoins used as a means of payment into the UK regulatory perimeter."[136]

The Financial Services and Markets Bill (FS&M Bill), which has now completed all its stages in the House of Commons, achieves this by two amendments. First, extension of the existing authorisation and registration regime under the current e-money regulations (the Electronic Money Regulations of 2011)[137] to cover Stablecoins used in retail payments. Secondly, amendment of the existing payments regulations (the Payment Service Regulations of 2017), coupled with an extension to Stablecoins of Part 5 of the Banking Act of 2009 and of the Financial Services (Banking Reform) Act of 2013, to ensure Stablecoin issuers, custodians and payment service providers are captured.

The legislation brings Stablecoins within the existing regulatory regimes for issuance, redemption and custody (where they will be supervised by the Financial Conduct Authority (FCA)) and systemically important payment systems (where they will be supervised by the Payments Systems Regulator (PSR) and, if deemed to be systemically important, the Bank of England).

This combination of measures aims to ensure that Stablecoins are issued by regulated, properly capitalised, well-managed and operationally sound entities, and especially by banks rather than non-bank entities; are backed by suitable reserves; can be stored in secure digital wallets and transferred safely between them; and are exchangeable for fiat currency - while preserving some degree of competition and innovation.

Like other jurisdictions, the legislation will govern fiat currency-backed Stablecoins only. The United Kingdom legislation excludes from the scope of its regulatory changes not only algorithmic Stablecoins, and variants that may be linked to assets other than fiat currency, but tokenised deposits as well. The logic is the same as that pursued by governments elsewhere – namely, that algorithmic and cryptocurrency and commodity-backed Stablecoins are similar to unbacked cryptocurrencies whose performance is anything but stable.

The legislation does not cover the exchanges where Stablecoins trade. This is because that is the subject of another consultation paper published in February 2023, that covers the trading of "crypto-assets" in general.[138] The government argues that the trading of Stablecoins should be regulated in the same way as other tokenised assets.

But the FS&M Bill does include provisions that will trigger tighter regulation by the Bank of England and the PSR of any Stablecoin that becomes "systemic" and so threatens financial stability and investor protection. Ultimately, that implies giving systemic Stablecoins membership of the deposit insurance scheme and access to the central bank as lender-of-last-resort.

In a discussion paper published in June 2021 the Bank of England declared that its aim was to ensure "the same level of public confidence in Stablecoins as

135 HM Treasury, UK regulatory approach to cryptoassets and Stablecoins: Consultation and call for evidence, January 2021.

136 HM Treasury, UK regulatory approach to cryptoassets, Stablecoins, and distributed ledger technology in financial markets: Response to the consultation and call for evidence, April 2022, page 2

137 See footnote 33 above.

138 HM Treasury, Future financial services regulatory regime for crypto-assets: Consultation and call for evidence, February 2023.

commercial bank money."[139] It agreed that this must include "support from a central bank during a stress, and a backstop to compensate depositors in the event of failure."[140]

The Bank of England also accepts that Stablecoin issuers could displace banks in parts of the payment system. In its February 2023 consultation paper on a digital pound the Bank of England speculates that Stablecoins could become a powerful force in retail payments:

> ***If appropriately designed, within a robust regulatory framework, Stablecoins offering greater functionality than existing forms of electronic money could play an increasingly important role in retail payments, offering benefits such as convenient and cheaper payment services … Novel features such as programmability, smart contracts or micropayments, could drive demand for new digital payment methods. Stablecoins might also improve consumer choice, better integrate into digital services offering improved functionality, and promote competition. Currently, Stablecoins are traded and used as a settlement asset on centralised crypto asset exchanges and used in Decentralised Finance (DeFi) applications. But innovative functionality and attractive use cases could result in a Stablecoin achieving a large scale and becoming a systemic payment method, widely adopted for retail and/or wholesale payments.***[141]

The paper also speculates that a Stablecoin could be backed by assets held entirely at the Bank of England. While this would not transform a Stablecoin into a CBDC – it would not be a liability of the central bank but of its issuer – it could prove more attractive to consumers than existing forms of commercial bank money, because its reserves are of sounder quality. It is an idea that suggests the Bank of England believes that Stablecoins will establish themselves as a part of a new payment system, alongside CBDCs.

139 Bank of England, New Forms of Digital Money, Discussion Paper, 7 June 2021, page 6.

140 The deposit insurance scheme in the United Kingdom is the Financial Services Compensation Scheme (FSCS), which insures deposits up to a ceiling of £85,000. See Bank of England, New Forms of Digital Money, Discussion Paper, 7 June 2021, pages 15 and 81.

141 Bank of England and HM Treasury, The digital pound: a new form of money for households and businesses?, Consultation Paper, February 2023, Box E, page 45.

How Stablecoins are being regulated: Hong Kong

In Hong Kong, the Hong Kong Monetary Authority (HKMA) in January 2022 published a discussion paper on digital assets, seeking comments on Stablecoins in particular. A year later, the central bank published its conclusions.[142] They align with developments elsewhere: asset-backed Stablecoins only will be licensed by the central bank and algorithmic Stablecoins will be excluded. Indeed, the HKMA specifically referenced throughout their paper the alignment of their thinking with the recommendations of international regulatory bodies and the decisions of other jurisdictions.

Issuers of Stablecoins pegged to the Hong Kong dollar will have to be licensed by the HKMA, which will ensure the issuers govern, manage, segregate, audit and disclose their reserves, which must be both high quality and liquid, to an agreed set of rules. Though it is not yet clear whether the new regime can be introduced under existing regulations or requires an entirely new framework, or whether it can be implemented under existing laws, it is expected to come in force in 2023-24.

142 Hong Kong Monetary Authority, Conclusion of Discussion Paper on Crypto-assets and Stablecoins, January 2023.

How Stablecoins are being regulated: Singapore

The Monetary Authority of Singapore (MAS) published a consultation paper on e-money and payment tokens that encompassed Stablecoins as early as December 2019, but it proved too far ahead of both market and international regulatory developments to make recommendations.[143] It was the work of international regulators that prompted the MAS to re-visit the subject in a second consultation paper of October 2022.[144]

It proposes that banks issuing Stablecoins face no additional regulatory burdens, whether they issue Stablecoins backed by assets or tokenised deposits, while non-bank issuers that issue Stablecoins worth more than S$5 million must obtain a major payment institution licence. Issuers must have a base capital that is the higher of S$1 million or 50 per cent of annual operating expenses, and are not permitted to engage in trading, lending or staking of Stablecouns.

Regulated Stablecoins must, as in other leading financial jurisdictions, be asset-backed, and the assets be cash, cash equivalents or short-dated sovereign debt securities. Algorithmic Stablecoins remain outside the scope of the new regulatory regime. Although it is not yet clear when the new regime will come into force its alignment with developments elsewhere is plain.

143 Monetary Authority of Singapore, Consultation on the Payment Services Act 2019: Scope of E-money and Digital Payment Tokens, 23 December 2019.

144 Monetary Authority of Singapore, Proposed Regulatory Approach for Stablecoin-Related Activities, Consultation Paper, October 2022.

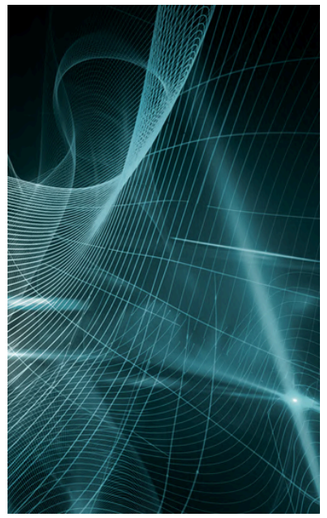
How Stablecoins are being regulated: A global consensus

So a clear pattern has emerged in all the major financial jurisdictions, in which Stablecoins backed by cash or short-dated sovereign money market assets denominated in fiat currency, and preferably issued by banks, are coming within the regulations that govern the creation and transmission of money, the deposit insurance schemes, the lender-of-last-resort duties of the central banks and the capital adequacy regulations to which banks are subject.

The IMF – whose membership encompasses 190 nation-states - has endorsed the G20-G7-FSB consensus, indicating that a common approach to the regulation of Stablecoins will extend to the developing and emerging markets in which cryptocurrency adoption has (especially by retail investors) progressed faster than in most developed economies. It is in developing economies that the risk Stablecoins displace national currencies and regulated banks is highest.

Global standards that inhibit non-banks in particular – most obviously, the large global technology companies – from developing a large market share of remittances to emerging economies are seen by the IMF as the best mitigant of the risk of Stablecoins disintermediating national banks and destabilising the banking system in less developed economies.

"Comprehensive, consistent, and coordinated global standards are required to achieve effective crypto regulation and supervision, especially for Stablecoins and their broader ecosystem," noted the IMF in September 2022. "Any global regulatory framework for Stablecoins should be comprehensive, risk-based, and flexible, and it should provide a level playing field."[145]



145 International Monetary Fund, FinTech Notes, Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements by Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto, Note/2022/008, September 2022, page 6.

Capital treatment of Stablecoin issuers

This global consensus is likely over time to embrace the imposition of capital requirements on issuers of asset-backed Stablecoins. The specific base capital and solvency requirements imposed on non-bank Stablecoin issuers by the MAS in Singapore, for example, are likely to be the first of many such measures.[146]

Why? Because capital requirements must apply to non-bank as well as bank issuers to eliminate the risk of regulatory arbitrage. The BIS has already published a standard that imposes minimum risk-weighted capital allocations that banks must calculate and apply to their direct and indirect exposures to the credit, market, liquidity and operational risks posed by digital assets (see Box).[147] Those digital asset exposures include Stablecoins that banks issue, hold as investments or collateral or safekeep for clients.

The requirements will be incorporated into the wider Basel capital adequacy framework ahead of coming into force on 1 January 2025. Eventual implementation will be by national governments, but 1 January 2025 happens to be the date which both the EU and the United Kingdom have set for implementation of the Basel 3.1 capital adequacy regime.

Although the exposures to which the new regime applies are limited at present, these will grow over time, especially if Stablecoins develop faster – which they are likely to do as a result of their enhanced regulatory status and their more demanding capital treatment on bank balance sheets. It is reasonable to suppose that banks will restrict their activities to Stablecoins that achieve the Group 1 classification, which is what the regime is intended to achieve.

146 See page 104 above and Monetary Authority of Singapore, Proposed Regulatory Approach for Stablecoin-Related Activities, Consultation Paper, October 2022, page 12.

147 Basel Committee on Banking Supervision, Prudential treatment of cryptoasset exposures, December 2022.

Capital treatment of Stablecoins at Banks

Group 1 digital assets: Digital assets with the least onerous capital treatment – one that follows the risk weightings under the existing Basel capital adequacy framework - are divided between tokenised traditional assets such as bonds, equities, derivatives, deposits, cash, commodities and payment tokens backed by the general assets of the bank that pose the same level of credit and market risk as the non-tokenised form of the asset (Group 1a assets) and assets with price stabilisation and redemption-at-par mechanisms that are effective at all times in linking the value of the assets to a verified traditional asset or pool of traditional assets (Group 1b assets), into which category non-algorithmic Stablecoins can be expected to fall, subject to a redemption test (see "Redemption risk test and a supervision/regulation requirement" below). The Basel Committee is studying whether there are statistical tests that can reliably identify low-risk Stablecoins and, if such a test is identified, will consider it as an additional requirement.

Group 2 digital assets: Tokenised traditional assets, Stablecoins and unbacked digital assets that fail to meet the criteria to be included in Group 1 are subject to a more conservative capital treatment, most obvious in the cap placed on the exposure (see "Group 2 exposure limit" below). They are divided between those that are hedged (Group 2) and those that are unhedged (Group 2b), with hedged assets enjoying some relief. Stablecoins that do not qualify as Group 1b assets due to redemption restrictions will be included in Group 2.

Group 2 exposure limit: A bank's total exposure to Group 2 digital assets must not exceed 2 per cent of the bank's Tier 1 capital and should generally be lower than 1 per cent. Exposures under the 1 per cent threshold will be risk-weighted according to whether the asset does or does not meet the hedging recognition criteria for Group 2a assets. Banks breaching the 1 per cent limit must apply Group 2b capital treatment (i.e., a 1,250 per cent risk weighting) to the amount by which the limit is exceeded. Where the 2 per cent limit is breached, all Group 2 exposures are subject to a 1,250 per cent risk weighting.

Infrastructure risk add-on: Additional capital must be allocated even to Group 1 assets if the infrastructure on which the Stablecoin is issued, traded and settled is later judged to have "weaknesses," such as settlement or redemption failure, custody, financial crime, unbalanced governance or hacking risks. Issuance on to permissionless proof-of-stake blockchains, for example, are likely to make it harder for an asset to enjoy Group 1 treatment.

Redemption risk test and a supervision/regulation requirement: To be eligible for inclusion in Group 1b a Stablecoin faces a redemption test. This means its issuer must maintain and carefully manage sufficient, fully disclosed, externally audited, legally documented and enforceable and operationally settleable reserve assets with minimal market and credit risk to enable the Stablecoin to be redeemable at all times, including during periods of extreme stress, for the amount of fiat currency to which the Stablecoin is pegged. The redemption test must be met by over-collateralisation if necessary. The Stablecoin must also be issued, transferred and safekept by regulated entities subject to capital and liquidity requirements (i.e., banks). Stabilisation mechanisms that reference other digital assets or rely on "protocols"– as algorithmic Stablecoins do – are excluded altogether.

Assets received as collateral: Group 1b digital assets that a bank receives as collateral are not permitted to be recognised as eligible collateral for the purposes of calculating regulatory capital requirements.

Other elements: The operational risk, liquidity, leverage ratio and large exposure requirements will be applied to both Group 1 and Group 2 digital asset exposures.

Custodial assets: The credit, market and liquidity risk requirements (see "Other elements") are not applied to digital assets held in custody on behalf of customers.

Source: Basel Committee on Banking Supervision, Prudential treatment of cryptoasset exposures, December 2022.

Why regulators want banks to monopolise Stablecoin issuance

Bringing Stablecoins within the regulatory perimeter of the banking industry in all senses – money creation and transmission, depositor protection, lender-of-last-resort privileges and risk-weighted capital allocations - makes sense. If regulators wish to avoid Stablecoins becoming a source of instability, requiring them to be issued by regulated banks backed by capital as well as lender-of-last-resort privileges and deposit insurance, is the obvious option in the absence of simply replacing them by a CBDC.[148]

In their ability to attract fiat currency, Stablecoins are comparable to bank deposits, which are the foundation of the loans that create commercial bank money. In their yield-based competition with banks to attract deposits, particularly wholesale deposits, they challenge the ability of banks to manufacture that commercial bank money, including through competition for the HQLAs such as the Treasury bills that regulators require regulated banks to hold for liquidity purposes.

The reliance of Stablecoins on reinvestment in yield-generating money market instruments also lends them an aspect comparable to money market funds, which have threatened financial stability at least twice in the recent past.[149]

Naturally, regulators are concerned that Stablecoins will compete with existing forms of payment and funding within established banking systems. Ironically, bringing them within the regulatory framework probably amplifies their disruptive potential, by increasing public confidence. This explains the clear preference of the central banks to confine issuance to regulated banks.

148 The other alternative, of insisting that Stablecoins be backed by one-for-one by sovereign bills or central bank reserves would turn Stablecoin issuers into "narrow" banks that squeeze credit, by attracting deposits from commercial banks that the Stablecoin issuers cannot use to manufacture credit themselves. See Gary B. Gorton and Jeffery Y. Zhang, Taming Wildcat Stablecoins, 30 September 2021, pages 37-38.

149 See above, "Why Stablecoins can never be completely stable."

Regulated banks are experimenting with Stablecoin look-alikes

Banks are already experimenting successfully with Stablecoins, or at least with a variant that is not captured by the regulatory regime envisaged by the global consensus: the tokenised deposit. Unlike Stablecoins, these are a claim not on assets backing the issue but the deposit-taking bank, in common with any bank deposit.

The best known is the JPM Coin, a digital token representing fiat currency US dollar deposits issued on to a private blockchain network. Announced by J.P. Morgan in February 2019, the JPM Coin enables clients of the bank to transfer US dollars held on deposit with J.P. Morgan to other clients of the bank, including across national borders, instantaneously. The JPM Coin is comparable to a Stablecoin not because it is asset-backed but because it is pegged 1:1 to the US dollar.

Also in 2019, Wells Fargo developed a similar service for internal settlement of cross-border payments, with a view to creating savings in liquidity costs for clients. That year the bank ran the Wells Fargo Digital Cash pilot, in which it issued tokens against cash collateral supplied by its branches on a 1:1 basis on to a blockchain network to settle internal book transfers between branches across national borders. The real-time settlement this made possible created the anticipated liquidity savings

for clients.[150]

Jewel Bank, a bank specialising in digital assets that was licensed by the Bermuda Monetary Authority in June 2022, also plans to issue its own US dollar-linked Stablecoin to facilitate instant settlement of transactions between "select clients."[151] The intention of the bank is to add further Stablecoins linked to other fiat currencies, to support the round-the-clock trading activities of exchanges, intermediaries and investors active in the digital asset markets.

In the summer of 2022, a consortium of American banks led by New York Community Bank, NBH Bank, FirstBank, Webster Bank and Synovus Bank announced it was sponsoring the issuance of a tokenised deposit called USDF.[152] The ambition of the USDF consortium is to make it cheaper and faster for member-banks – as opposed to their underlying customers - to exchange value on a private, permissioned blockchain network.

In March 2022 ANZ announced that they had settled a payment using an Australian dollar "Stablecoin" (A$DC) backed by client deposits – making it a tokenised deposit rather than a true Stablecoin - between a family office and a digital asset trading firm in which the family office was a shareholder.[153] The same family office later used A$DC to purchase tokenised carbon credits on a carbon trading platform.[154]

A year later, in March 2023, National Australia Bank (NAB) announced that it had settled an intra-bank cross-border, cross-currency transaction using an in-house "Stablecoin" (AUDN) on a public, permissionless blockchain network. Its aim, in common with other banks that have issued tokenised deposits, is to help corporate clients settle cross-border transactions more quickly and simply and at lower cost.[155]

Like the ANZ A$DC, NAB refers to AUDN as a "Stablecoin," and backs it with Australian dollars, but it is a liability of the bank, making it a tokenised deposit rather than a Stablecoin. NAB says its ambition is to use the same technique to facilitate cross-currency transactions in New Zealand, Singapore and US dollars, euro, Yen and Sterling as well as Australian dollars.

In April 2023, Brazilian investment bank BTG Pactual announced the issue of a Stablecoin pegged to the US dollar (BTG DoI) to help clients using its retail cryptocurrency trading platform Mynt.[156] This issuance is closer to the original rationale for Stablecoins: a stable means of entering and exiting the various cryptocurrency networks and of storing liquidity while out of the market.

Also in April 2023, Société Générale issued on to a public blockchain (Ethereum) a genuine euro-denominated Stablecoin called the EUR CoinVertible(EURCV). It is backed by segregated cash deposits at banks of equivalent credit rating to Société Générale and short-term securities from issuers of equivalent credit rating to Société Générale. The bank says it expects EURCV to be used to settle digital asset transactions and provide liquidity on blockchain networks; to meet cash margin calls; and in corporate treasury services and cash management.[157]

Supporting corporate cash movements is the core function of tokenised deposits such as the JPM Coin, A$DC and AUDN. They are issued by the banks primarily to facilitate payments transactions between internal customer accounts in private rather than public networks. They enjoy the benefit of being regulated under existing banking regulations (including capital, liquidity, net stable funding, reporting and stress testing requirements). Because they

150 See Laura Fontana, vice president, product strategy - DLT program, Wells Fargo, presenting on digital cash during Cordacon 2020, the R3 conference, at https://www.r3.com/cordacon/wells-fargo-digital-cash-for-global-payment-services

151 Jewel Bank, press release, 7 June 2022, Jewel Bank Receives Bermuda Bank License to Serve Global Crypto Firms, Issue Stablecoins, Provide Real-Time Settlement Services.

152 See https://www.usdfconsortium.com/

153 ANZ, ANZ completes landmark Stablecoin payment, 24 March 2022, press release.

154 https://blockworks.co/news/anz-banks-stablecoin-used-to-purchase-tokenized-carbon-credits

155 National Australia Bank, NAB completes world-first with cross-border stablecoin transaction, press release, 14 March 2023.

156 BTG Pactual, BTG Pactual launches BTG DoI, the world's first dollar-backed stablecoin from a bank, press release, 4 April 2023.

157 Société Générale, "Société Générale –FORGE launches `Coinvertible': the first institutional Stablecoin deployed ion a public blockchain, press release, 20 April 2023.

are issued into closed or permissioned networks, and exchanged between wallets hosted by the bank only, it is also easier for banks to comply with settlement finality and financial crime obligations.

So although it is being done – as with AUDN and EURCV (see above) and JPM Coin (see below) - it is in principle more challenging for banks to issue tokenised deposits at scale on to public blockchains, since they are open networks. Bank issuers then need to check the identity of depositors (a point which Société Générale highlights) and ensure tokenised deposits both retain their ranking among creditors of the issuing bank (holders of EURCV are given direct access to the underlying collateral) and remain within the scope of deposit insurance schemes. These constraints make it difficult for tokenised deposits to trade on public blockchains.[158]

That said, J.P. Morgan is now embarked on an experiment in which the JPM Coin model will also be used on a public as opposed to a private, clients-only blockchain network. The bank is participating in Project Guardian,[159] an initiative led by the MAS to assess the value of tokenising assets on to open blockchain networks capable of interacting with existing infrastructure. In early November 2022, J.P. Morgan announced it had successfully tokenised Singapore dollars and exchanged them for tokenised Japanese Yen, on a public blockchain network.Regulated banks, which already have close relationships with regulators, have clear regulatory scope to experiment, even on public blockchain networks. Indeed, regulators, both domestic and international, have made clear repeatedly that they welcome innovations that make payments services, especially across national borders, cheaper, faster, more accessible and more transparent.

158 There is a useful summary of tokenised deposit issues in Box 2 on pages 18-19 of International Monetary Fund, FinTech Notes, Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements by Parma Bains, Arif Ismail, Fabiana Melo, and Nobuyasu Sugimoto, Note/2022/008, September 2022.

159 Monetary Authority of Singapore, press release, MAS Partners the Industry to Pilot Use Cases in Digital Assets, 31 May 2022.

A future network of networks linked by Stablecoins?

Extending the experiments of JPM Coin, Wells Fargo Digital Cash, Jewel Bank, ANZ, NAB and BTG Pactual to non-clients is a tantalising vision of an entirely new infrastructure for domestic and cross-border payments made up of networks of networks. Through Partior, an independent company set up in 2021 by Temasek Holdings, J.P. Morgan and Development Bank of Singapore (DBS), work on realising such a vision has begun already.

The aim of Partior is to create an ever-expanding network of banks, central banks, payments market infrastructures and technology vendors on a global scale. It declared aim is to "make cross-border value exchange faster, more reliable, and secure for our customers while staying connected and interoperable with the global financial system's existing infrastructure."[160]

Retaining existing intermediaries in inter-bank payment is politically prudent, but whether it is compatible with cutting costs, accelerating settlement timetables, increasing transparency and fostering inclusion, must be doubtful. In short, attempts to build a global network of networks is likely to face formidable resistance from entrenched interests as well as a variety of technical barriers.

Chief among those technical barriers is the need for data standards to facilitate exchanges of data between financial institutions on different blockchain networks. JPM Coin, for example, is issued on to a private version of the Ethereum blockchain (Quorum), while Wells Fargo Digital Cash uses the R3 Corda blockchain and Jewel Bank relies on the Polygon platform which is built on the Ethereum blockchain.

A variety of cross-blockchain data standards, bridges, protocols and blockchain-agnostic APIs now exist (though bridges have proved susceptible to hackers). SWIFT, the bank-controlled international payments

160 www.partior.com

cooperative, believes its ISO 20022 data dictionary - a repository of defined business terms that can be used to automate data exchanges, including through APIs - can also help.[161]

In 2022, a group of 15 companies that have between them issued 20 Stablecoins formed a body called Stablecoin Standard to develop a set of industry standards, encouraged by the award of quality badges, to encourage Stablecoin issuers to adopt best practices.[162] In tandem with clear regulatory status, initiatives of this kind might one day realise the vision of a network-of-networks linked by Stablecoins.

161 Juliette Kennel, Exploring coexistence in the securities industry: Why the ISO 20022 central dictionary is the key to interoperability and realising data opportunities, Journal of Securities Operations and Custody Volume 14, Number 2, 11 January 2022.

162 https://stablecoinstandard.com/

The regulation of non-bank Stablecoins is unresolved

For now the clear regulatory preference for banks as issuers of Stablecoins leaves non-bank issuers of asset-backed Stablecoins such as Circle, Gemini, Paxos and Tether suspended uncomfortably between the regulatory regimes being prepared for cryptocurrencies and the regulatory regimes being prepared for Stablecoins.

If they are to be regulated as cryptocurrencies, the future status of non-bank Stablecoins is less clear than that of bank-issued, asset-backed Stablecoins. Although it is wrong to suggest that cryptocurrencies were not regulated at all, it is true that regulation has advanced unsteadily. Now it is gathering pace.

Losses incurred by retail investors are one factor. The value of cryptocurrency lost to various scams, thefts, frauds and pump-and-dump schemes has risen from a low of at least US$4.6 billion in 2018 to a minimum of US$20.6 billion in 2022, which is surprising in a year when cryptocurrency market values as whole plummeted.[163]

Although the increase in illicit transactions by sanctioned States and individuals accounts for much of the rise, 2022 was still the worst year ever for cryptocurrency hacks, with US$3.8 billion stolen, much of it by a single State actor.[164]

Criminal activity overshadows Stablecoins as well as cryptocurrencies. After all, for hackers, which rely on converting stolen digital assets into liquid forms, Stablecoins are useful as an asset that is likely to hold its value and which cannot be frozen by its issuer.

So it is not surprising that regulators in all the major financial jurisdictions – the United States, the EU, the United Kingdom, Singapore and Switzerland – are accelerating the regulation of cryptocurrencies.

Respectable participants in the cryptocurrency market are encouraging them, on grounds regulation will encourage greater involvement by institutional

163 Chainalysis, The 2023 Crypto Crime Report, February 2023, chart, "Total cryptocurrency value received by illicit addresses, 2017-2022," page 5. Chainalysis emphasises its estimates are a "lower bound."

164 Chainalysis, The 2023 Crypto Crime Report, February 2023, chart "Yearly total cryptocurrency stolen by North Korea-linked hackers, 2016–2022," page 60.

investors and intermediaries.

The cryptocurrency markets are subject already to the global AML, CFT and sanctions screening rules, in principle if not in practice.[165] Cryptocurrency derivatives, cryptocurrency funds and cryptocurrency marketing are also regulated already in all five of the major jurisdictions. These measures, which are likely to be bolstered by the inclusion of cryptocurrencies themselves within the regulatory perimeter, are clearly designed to protect retail investors.

Another factor driving regulation of cryptocurrencies is the maintenance of financial stability, or the risk of crises in the cryptocurrency markets spilling over into the established financial markets.

IMF officials have noted an increased risk of price volatility in both cryptocurrencies (chiefly Bitcoin) and non-bank Stablecoins (chiefly Tether) spilling over into traditional equity markets, driven by the increasing engagement of institutional investors and intermediaries with blockchain technology stocks and cryptocurrency markets.[166]

The HKMA has drawn predictable comparisons between unregulated, non-bank, asset-backed Stablecoins and money market funds, warning that any loss of confidence in the issuer will lead to large-scale redemptions, which are likely to prompt fire-sales of their reserve assets, creating knock-on effects in the money markets as the prices of treasury bills, commercial paper and repo are driven down.

The authors of the HKMA study, which note the mass redemptions of the Tether USDT Stablecoin in May 2022 during the collapse of the Terra USD algorithmic Stablecoin, believe the risk of contagion from non-bank, asset-backed Stablecoins is real. They recommend full disclosure of the details of reserve assets and restrictions on their composition, plus well-defined rights of redemption to prevent Stablecoin issuers suspending redemptions in stressed markets.[167]

It makes sense. The journey from loss of confidence in the issuer of a Stablecoin to loss of confidence in the liquidity of the reserves will not be long, but it can be obstructed by rules that specify the nature of the reserves backing a Stablecoin and their ability to be liquidated quickly enough to meet redemptions. This may be one way in which non-bank Stablecoins are regulated, but it would require a high degree of international co-operation between regulators.

The risk that Stablecoins will drain banks of the deposits that support their lending activities, and so reduce the volume of credit available to the real economy, is a further concern of regulators in relation to non-bank Stablecoins, and one of longer standing. An obvious way to avoid that risk is for regulators to insist that all asset-backed Stablecoins hold their reserves in the form of bank deposits. In other words, all non-bank Stablecoins would be a variant of tokenised deposits.

The other – and the global regulatory consensus favours this - is to stipulate what Stablecoins can hold as reserves, because the destabilising effects of Stablecoins depend on where the money they attract comes from and what they invest it in.

If a Stablecoin attracts funds from deposits and invests them in government bills and bonds, the ability of the banks to manufacture credit is reduced. But if the Stablecoin attracts assets from money market funds invested in government bills and bonds which it then reinvests in deposits, the ability of banks to manufacture credit will be increased.[168]

The market impact of Stablecoins is certainly not always going to be negative. If Stablecoins replaced the use of physical cash, for example, they might actually increase the volume of credit manufactured by banks because they would substitute commercial bank money for central bank money.

Likewise, as safe havens from volatility in the cryptocurrency markets, demand for Stablecoins tends to surge when cryptocurrency

165 See pages 66 above.

166 Tara Iyer, Cryptic Connections: Spillovers between Crypto and Equity Markets, Global Financial Stability Note No 2022/01, January 2022.

167 Hong Kong Monetary Authority Research Memorandum, An Assessment of The Volatility Spillover From Crypto to Traditional Financial Assets: The Role Of Asset-Backed Stablecoins, 21 November 2022, page 16.

168 Gordon Y. Liao. and John Caramichael, "Stablecoins: Growth Potential and Impact on Banking," International Finance Discussion Papers 1334, Board of Governors of the Federal Reserve System, Table 3, page 12.

prices fall sharply. This forces Stablecoin issuers to buy more money market assets to mint more Stablecoins, which can have stabilising effects in the money markets.[169]

All of which suggests that regulation of non-bank Stablecoins might focus on the composition of their reserves (to encourage them to hold bank deposits) and their level of access to central bank money (to inhibit their attractions in a flight to safety). But before this can happen, non-bank, asset-backed Stablecoins will have to be brought within the purview of regulation (only algorithmic Stablecoins face permanent regulatory exclusion).

Some non-bank Stablecoin issuers are comfortable with their current status while others are seeking a regulatory embrace. Tether, for example, complies with the guidance from the NYDFS on disclosure and auditing of its reserves but the only other regulatory constraint on its business is compliance with KYC, AML, CFT and sanctions screening obligations. In other words, it checks at on-boarding that users of its Stablecoin are not money launderers, terrorists, sanctioned persons or other types of financial criminal.

Circle, issuer of the USDC Stablecoin, on the other hand, has sought a higher degree of regulatory authorisation. It is regulated as a licensed money transmitter in all 50 of the states that make up the United States of America and Puerto Rico.[170] It is also regulated as an Electronic Money Institution (EMI) by the FCA in the United Kingdom.[171] The firm has applied for authorisation as a payment service provider (PSP) under the Payment Services Directive in the European Union.

Puzzlingly, the pursuit of regulatory respectability does not make a non-bank Stablecoin issuer immune to regulatory action, at least in the United States, where regulators have acquired a recent reputation for regulation-by-enforcement.

In February 2023, for example, the SEC issued a Wells Notice to the Paxos Trust Company. A Wells Notice informs a prospective respondent of the substance of the charges that a regulator is recommending for legal action. In this case, the Wells Notice alleged that the BUSD Stablecoin, which Paxos issued on behalf of Binance in addition to its own Stablecoins, is a security and that Paxos should have registered the offering of BUSD under the federal securities laws.

169 This is the opposite of what happens to money market funds in a normal "run" crisis, when redemption requests force the funds to sell money market assets.

170 Since 1999, non-bank financial institutions in the United States have been regulated as "money services businesses," primarily for reasons of AML, CFT and sanctions screening under the Currency and Foreign Transactions Reporting Act of 1970, commonly referred to as the Bank Secrecy Act (BSA), which requires US financial institutions to assist US government agencies to detect and prevent money laundering.

171 EMIs are regulated under the Electronic Money Regulations of 2011 and the Payment Services Regulations of 2017. See footnote 33 above. EMIs have to comply with AML, CFT and sanctions screening regulations.

Yet Paxos is not only regulated already but has seen expanding its regulated status as its principal competitive advantage. The company secured a State trust company charter from the NYDFS as long ago as 2015. In April 2021 it received preliminary conditional approval from the OCC to establish a national trust bank.[172]

In October 2021, Paxos applied to the SEC for a clearing agency licence so it can settle securities on a blockchain network. In July 2022, the company became the first Stablecoin issuer to disclose the reserves underpinning a Stablecoin.[173] In November 2022, Paxos received a licence from the MAS to offer digital payment token services.[174]

So the basis of the SEC action is difficult to fathom. BUSD is hard to depict as a security. It is backed by disclosed holdings of US dollar cash, US Treasury bills and debt securities[175] and, being a Stablecoin, is not meant to increase in value. As Paxos insisted in its response to the Wells Notice, "BUSD is not a security under the federal securities laws" because it meets neither the Howey Test nor the Reves Test[176] and is "always backed 1:1 with US dollar-denominated reserves, fully segregated and held in bankruptcy remote accounts."[177]

There are several explanations for the actions of the SEC. One is that the true target of the Wells Notice is not Paxos but

172 Office of the Comptroller of the Currency (OCC), OCC Conditionally Approves Chartering of Paxos National Trust, news release, 23 April 2021. This expired on 31 March 2023.

173 Paxos press release, Paxos Leads Digital Asset Industry by Becoming First Issuer to Disclose Full Monthly Reserve Holdings Backing USDP and BUSD Regulated Stablecoins, 8 July 2022.

174 Paxos Press Release, Paxos is the first US-Based Blockchain Infrastructure Platform to Secure Regulatory Oversight in Key Financial Hubs of New York and Singapore, 2 November 2022.

175 See "Consolidated Reserves of the BUSD Stablecoin" above.

176 Paxos Press Release, Update from Paxos CEO & Co-Founder Charles Cascarilla, 21 February 2023. The Howey Test judges whether an investment is a security by whether it is (a) an investment of money (b) a common enterprise in which the purchaser's and the promoter's interests are aligned (c) there is an expectation of profits on the part of the purchaser and (d) the profits derive from efforts of others (e.g., the issuer of the digital asset). The Reves Test assumes an investment is a security unless a similar instrument has been judicially determined to fall outside the definition of a security (there is a list of these, with new exceptions added by the courts on the basis of the motivations of the seller and the purchaser, the distribution of the instrument, the expectations of the investing public and any alternative regulatory status for the instrument).

177 Paxos Press Release, Paxos Issues Statement, 13 February 2023.

Binance, whose branding adorns the BUSD Stablecoin.[178]

After all, the other Stablecoin issued by Paxos, Pax Dollar (USDP), is unaffected, although it too is backed by a similar blend of US dollar cash and US Treasury bills and securities.[179]

Nevertheless, following the issue of the Wells Notice, the NYDFS asked Paxos to stop minting BUSD Stablecoins "as a result of several unresolved issues related to Paxos' oversight of its relationship with Binance in regard to Paxos-issued BUSD."[180] Paxos immediately ended its relationship with Binance for the BUSD Stablecoin.[181]

Another possible explanation is that the SEC is developing a view that Stablecoins are securities in the same way that money market funds are securities. Because it is invested in money market assets, a Stablecoin does have similarities to money market funds.[182] Indeed, the decision by Circle, issuer of the USDC Stablecoin, to shift its non-cash reserves from direct holdings of US Treasury bills and bonds to a dedicated money market fund run by BlackRock (an investor in Circle) and custodied at BNY Mellon, underlines that similarity.

This has raised a third anxiety about possible spill over from Stablecoins to wider financial markets – a flight to the safety of central bank money.[183]

Money market funds are able to apply to invest cash with the Federal Reserve via the Overnight Reverse Repo Facility (ON RRP) that the central bank introduced in September 2013. This implies that holders of the USDC Stablecoin will have access to an investment in central bank money by buying US Treasury securities from the Federal Reserve Open Market Trading Desk.

This circuitous form of access to central bank money could be destabilising in stressed markets, as investors move deposits and could be destabilising in stressed markets, as investors move deposits and sell other assets to buy the Stablecoin. In practice, the central bank would have to expand its balance sheet to accommodate the desire of panic-stricken investors to hold central bank money, while the supply of commercial bank money available to lend would shrink.

Money market funds, which have suffered repeated episodes of instability, have already become the main counterparty in the ON RRP facility.[184] They are large too. In the United States, money market funds control assets worth a quarter (US$4.89 trillion at March 2023)[185] of all the cash deposited with American banks (US$17.6 trillion).[186]

In a crisis, money market funds with access to central bank money could create bank runs if depositors engage in a classic flight to safety by switching from bank deposits to USDC as offering the equivalent of central bank money. A bank-backed think tank in the United States has raised this concern.[187]

The threat to bank deposits, and therefore to bank funding, is of course the main destabilising potential identified by regulators in Stablecoins (and CBDCs). If the ON RRP facility became a mechanism by which money fled the balance sheets of banks for the (theoretically unlimited) balance sheet of the central bank, a Stablecoin might become a vector of contagion not just from the cryptocurrency markets to the traditional financial markets but to the bank deposit markets as well.

It is questionable whether this possibility can safely be ignored by regulators, on grounds of both investor protection and financial stability. It can be argued that investors in non-bank but asset-backed Stablecoins are entitled to the same protection from fraud, misconduct, negligence, operational failures, market manipulation, personal data breaches and insolvency as consumers who deposit money in a bank.

If the Stablecoin is issued by a bank – which is now the clear preference of regulators – that contributes to a deposit insurance scheme, they should also be entitled to insurance protection.

Bank-issued Stablecoins that are not backed by insured deposits (and, by extension the capital of the bank) remain a possibility. However, if they are to remain stable enough to guarantee they can

178 In January 2023, a month before the Wells Notice was issued, Binance addressed reports that the "wrapped" BUSD token, Binance-Peg BUSD (PBUSD), which allows BUSD to be used on blockchain networks other than its native Ethereum, was not fully backed by BUSD. Binance explained that PBUSD only appeared to be less than fully backed by BUSD because the collateral was initially held across more than one digital wallet, and that all reserves were now held in a single wallet. Importantly, PBUSD is issued not by Paxos but by Binance, and the BUSD underpinning PBUSD is not held by Paxos either but - as Binance explained – by Binance. See Binance Blog, "How We Back Binance-Peg BUSD (and Explaining Historical Discrepancies)," 10 January 2023.

179 See "Consolidated Reserves of the USDP Stablecoin "above.

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180 New York State Department of Financial Services (NYDFS), Notice regarding Paxos-Issued BUSD, 13 February 2023. See also "How asset-backed Stablecoin issuers invest their reserves" above.

181 Paxos Press Release, Paxos Will Halt Minting New BUSD Tokens, 13 February 2023.

182 See "Why Stablecoins can never be completely stable" above.

183 Jeremy Fox-Green, Chief Financial Officer at Circle, "Deepening Our Partnership with BlackRock," 3 November 2022.

184 Hubert Ennis and Jeff Hutter, The Fed's Evolving Involvement in the Repo Markets, Federal Reserve Bank of Richmond, Economic Brief, September 2021.

185 Investment Company Institute, Money Market Fund Assets, press release 2 March 2023.

186 Deposits, All Commercial Bank, St Louis Federal Reserve economic data.

187 Bank Policy Institute, Will USDC's Blackrock Money Fund Create a Back-door CBDC, Give USDC an Account at the Fed or Both?, 4 January 2023.

be redeemed for fiat currency on a 1:1 basis, they would have to backed by HQLAs held in a segregated account.[188]

Non-banks issuing Stablecoins backed by HQLAs would find themselves in a less enviable position, unless they submitted to regulations, including capital and operational resilience obligations as onerous as those laid on banks – which effectively means becoming a bank.

Indeed, it is increasingly hard to see how truly non-bank Stablecoins can survive and thrive in the longer term without applying for a banking licence. Paxos has chosen to do exactly that, which is why in April 2021, the Office of the Comptroller of the Currency(OCC) granted the firm preliminary conditional approval of its application to establish a national trust bank.[189] However, this approval expired on 31 March 2023.[190]

The question whether non-bank Stablecoin issuers are effectively unregulated, deposit-taking banks reprises a criticism raised by American banks in the 1970s, when money market funds first became popular, but at the time the Supreme Court disagreed. Subsequent judgements also dismissed the idea that money market funds were banks on grounds investors could not withdraw their money on demand and the funds did not make (albeit narrowly defined) commercial loans.[191]

But then money market funds behaved exactly like banks when investors became concerned the funds could no longer provide full redemption of their holdings, as occurred in 2008 and 2020. Funds "broke the buck" in the face of a "run" that forced fire-sales of assets, and the central bank had to halt the "run" as if the funds were banks (and prop up the commercial paper market in which money market funds were major investors).[192] None of these developments have interrupted the growth of money market funds. Stablecoins have experienced the same difficulties - and may experience a similar growth trajectory too.

188 This obstacle – fluctuations in value which make it hard to use the currency in day-to-day transactions – coupled with a vulnerability to "runs" when the underlying reserves are seen as unsound, has undermined attempts to create private money throughout history. Restricting issuance to regulated banks, and insisting that Stablecoins are backed by HQLAs, are the obvious ways to mitigate the problem, and that is exactly the path regulators are following. See Gary B. Gorton and Jeffery Y. Zhang, Taming Wildcat Stablecoins, 30 September 2021.

189 Letter from Stephen A. Lybarger, Deputy Comptroller, Licensing, Office of the Comptroller of the Currency (OCC), 23 April 2021.

190 https://apps.occ.gov/CAAS_CATS/CAAS_Details.aspx?FilingTypeID=2&FilingID=318305&FilingSubtypeID=1093

191 Gary B. Gorton and Jeffery Y. Zhang, Taming Wildcat Stablecoins, 30 September 2021, criticise these judgements on grounds they ignore the fact that money market funds and Stablecoins are in practical, economic terms (if not legal ones) deposit-takers. See pages 13-14, 17-18 and 38.

192 See "Why Stablecoins can never be completely stable" above.

Regulatory concerns about the role of Stablecoins in tokenised asset markets

The risk of "runs" is why it is more likely than not that non-bank issuers of asset-backed Stablecoins will either opt to place themselves inside the regulatory perimeter by applying for banking licences or be corralled inside it by regulators anxious to mitigate the risks of investor losses and financial instability as "runs" overwhelm reserves.

This is where the interests of regulators and institutionally-minded participants in the cryptocurrency markets coincide. By making Stablecoins safe for regulated, institutional intermediaries and investors, regulation will not only facilitate the growth of the cryptocurrency markets but the tokenised asset markets as well. The growth of the tokenised asset markets depends on institutional money, and institutional money at scale demands regulated status.

If the tokenised asset markets are to grow, regulators cannot allow unregulated Stablecoins to retain their present roles as the sole means of entry and exit to token markets, as mechanisms for moving between blockchain-based protocols and for trading, lending, borrowing and settling tokens, and for storing value.

Regulated asset managers, banks and insurers are involved in the token markets already, as investors, custodians and insurers. Banks have built tokenisation platforms to enable their clients to issue tokens, to closed groups if not in open markets. Custodian banks are safekeeping not only the reserves of Stablecoin issuers but the tokenised assets of buy-side clients. If Stablecoin issuers are exposed to the risk of deposit-taking banks, so are those deposit-taking banks exposed to the risk that Stablecoin issuers facing a "run" will undermine their funding.[193]

193 Euromoney, DeFi Pioneer MakerDAO funds regulated US bank, 7 September 2022. The article reported that MakerDAO, the issuer of the DAI Stablecoin, provided US$100 million to Huntingdon Valley Bank (HVB), a Pennsylvania community bank in August 2022. But any bank taking deposits from Stablecoin issuers faces the same risk of precipitate withdrawals in a crisis, as the events of March 2023 proved. See "How asset-backed Stablecoin issuers invest their reserves" above.

If Stablecoins became a widely used means of payment in tokenised asset markets, their systemic importance will substantially increase.[194] In the traditional securities markets, by contrast, settlement in central bank money between regulated banks has become the norm in major markets, displacing riskier commercial bank money settlement.

Which is one reason why the Swiss National Bank is exploring how a Stablecoin backed by sight deposits at the central bank could be used to settle tokenised transactions in central bank money: "As part of the project we aim to examine ways in which private token money that is backed one-to-one by sight deposits at the SNB, can be legally structured in such a way that, in the event of the bankruptcy of the token issuer, it would have a risk profile comparable to that of central bank money."[195]

Another problem regulators confront is that the market infrastructures that support cryptocurrency trading and investment have long since proved inadequate, with unconscionable delays in settlement, indefensible surges in settlement fees and inadequacies in data sources ("Oracles") that fuel market abuses, yet tokenised asset markets depend on similar systems.

Regulators are concerned that the operational infrastructure might actually fail altogether, and so create instability through a backlog of unsettled transactions comparable with that which occurred in the conventional equity markets in the late 1980s. The transaction volumes associated with the increase in the size of the cryptocurrency markets between 2018 and 2021 - and their precipitate shrinkage since November 2021 – has amplified this concern.

Finally, there is a reputational issue. Central banks, regulators and government officials are increasingly concerned by the use of cryptocurrencies to evade tax, especially in emerging economies, where cryptocurrencies have become an important route around capital controls as well as taxes.

In the absence of CBDCs, non-bank Stablecoins continue to play a substantial role in the issuance and trading of cryptocurrencies and tokenised assets and in the settlement of the transactions that result.

It is not hard to see why. Their availability is not restricted to clients of a bank; they are freely available on cryptocurrency exchanges; and they are used heavily by traders in the cryptocurrency and DeFi markets, so have size and liquidity. Even their vulnerability to speculative attack whenever they deviate from their fiat currency anchor is attractive to the criminal mind.

194 Financial Stability Board, The Financial Stability Risks of Decentralised Finance, 16 February 2023.

195 Andréa M. Maechler and Thomas Moser, Swiss Payments Vision – an ecosystem for future-proof payments, Money Market Event, 30 March 2023, page 9.

Conclusion

The regulation of Stablecoins remains a work-in-progress, but the outlines of the future structure are now clear. Regulators see Stablecoins as a threat to the established payments and banking systems and have concluded that the best way to contain the risk without destroying the incentive for market participants to innovate is to privilege bank issuers over non-bank issuers. This division is unlikely to prove stable, however.

The worlds of cryptocurrency and fiat currency are converging. Stablecoins are part of that convergence, by providing a link between the two worlds. But wider forces are at work. The distinction between private and public blockchains is blurring, with supranational issuers and regulated banks now prepared to use public blockchains. Trading is increasingly round-the-clock, creating a constant demand for cash to settle transactions.

A cryptocurrency innovation - tokenisation – is disrupting the established equity, debt, fund and privately managed asset markets, and creating a demand for tokenised forms of cash to provide that readily available settlement currency.

Exchanges, brokers and technology vendors are emerging to make it easier for investors to switch quickly and cheaply between cryptocurrencies, tokens and traditional markets – in large part because regulation is in place in security token markets already and expectations that regulation will be extended to the cryptocurrency markets are likely to be fulfilled.

Physical trade in goods and services is digitising too. The United Nations estimates that in 2019 the total value of e-commerce sales was US$26.7 trillion, four fifths of it between businesses and three quarters of it taking place within and between just ten developed economies.[196] As the share of national, regional and global trade that is digitised increases, digital tokens are likely to become the primary vehicle for the exchange of goods and services.

Meanwhile, appreciation of the most powerful feature of digital forms of money – its programmability – is spreading. When borrowers and lenders can agree what event or data triggers a payment, and programme it into a smart contract embedded in a token, there are potentially massive savings in liquidity and capital to be gained.

Governments too are persuaded of the value of digital money for the unbanked, and in making cross-currency payments cheaper and more efficient, and they are now investigating whether programmable money can deliver conditional welfare payments more efficiently.

CBDCs are the customary answer to the demands for both reliable and stable on-chain cash and programmable money. But no major convertible currency is yet fully committed to issuing a CBDC and, even if one or more jurisdictions were, the introduction of CBDCs in the major currencies is years away.

Stablecoins, issued by regulated banks and backed by high quality and liquid reserve assets denominated in major fiat currencies, managed by regulated asset managers and held in custody by regulated banks, can be programmed. They also have more scope to innovate than central bank money. So Stablecoins are likely to remain the solution for digital money for at least the short and medium-term.

But they might also be the solution for the long-term, with bank-issued Stablecoins fulfilling the role of commercial bank money in the current banking system. Just as banks have privileged access to central bank money through reserves today, so in the future they will maintain privileged access to central bank money in the form of CBDCs.

Stablecoins, issued mainly by banks, will be used by consumers and businesses to borrow and lend money, trade financial assets and make payments. In other words, Stablecoins and CBDCs may not be mutually exclusive alternatives but complementary layers in a layered but integrated and inter-operable monetary system.

For Stablecoins to become part of that integrated monetary system, they need to be inter-operable. If they are not, the system will fragment, with particular Stablecoins achieving dominant positions within certain networks but not being exchangeable for Stablecoins issued on to other networks, let alone CBDCs.

The solution lies in the development and adoption of technical standards to facilitate inter-operability – and that work is now under way.

An unresolved question is whether bank-issued Stablecoins will drive out – or, perhaps more accurately, draw in - non-bank-issued Stablecoins. The answer to that question will unfold as the traditional financial markets gradually merge with the tokenised markets that are now coming into being. Importantly, that convergence is not merely a case of adopting common techniques. It will also be a case of adopting a common set of regulations, well-captured in that regulatory motto: “Same business, same risk, same rules."

196 United Nations Conference on Trade and Development, Global e-commerce jumps to $26.7 trillion, COVID-19 boosts online sales, 3 May 2021, Table 3.

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