



Monetary sovereignty in the digital era. The law & macroeconomics of digital private money

Edoardo D. Martino

University of Amsterdam (UvA), the Netherlands

ARTICLE INFO

JEL classification:

E42
E44
G24

Keywords:

Monetary sovereignty
Monetary competition
Private money
Stablecoins
Optimal digital currency area

ABSTRACT

The relationship between private and public money has shaped the economic and legal debate over money for centuries. Private money can either compete with or complement public money and this depends on the applicable law and the relative powers of the State and private parties. The rise of disruptive digital and cryptographic technologies applied to money creation has the potential to innovate this century-long debate.

This article proposes a framework to analyse the role of the law in the relation to the risks and benefits of having circulating private money competing with public money. Accordingly, the article highlights the unprecedented threat to monetary sovereignty, the risks to systemic stability and, ultimately, to democratic decision-making prompted by digital private money.

To counter these risks while seizing potential efficiency gains generated by novel forms of private money, the article proposes to regulate convertibility and fragment by regulation such a potentially global market.

1. Introduction

Monetary sovereignty is a key element of the modern State. This article discusses the current challenges to monetary sovereignty related to the current digital and cryptographic revolution and analyses the role of the law in addressing these challenges.

In its modern connotation, the concept of sovereignty is intrinsically linked with the concept of control. In its simplest form, a state can be considered “sovereign” only so long as it has some form of control over territory and people.¹ Over time, the control over money has become a quintessential component of the sovereignty of modern States.² Indeed,

at some point in history, the State claimed a monopoly on the production of (public) money, granting legal tender status only to publicly produced money. This means that nobody can refuse or challenge the discharge of any debt if the payment is made using publicly produced money.³ In this context, private parties can also “produce” private money. For instance, a chartered bank can “produce” money in the form of insured or uninsured deposits. However, this form of money is under the control of the Sovereign, which regulates its issuer, the bank, and backs the bank’s promise to repay the sum to the depositor with legal tender. Therefore, as a first approximation, in modern States, private forms of money do not compete with public money; rather, they complement and expand

Assistant Professor of Law & Economics, University of Amsterdam (UvA), The Netherlands; Associate Researcher, European Banking Institute (EBI), Frankfurt am Main, Germany. Thanks to Hilary Allen, Oscar Borgogno, Pedro Magalhães Batista and Edmund Schuster for their feedback and opinions. An earlier version of this paper was presented at the *International Workshop on Financial Technology, Financial Inclusion and Competition Policy: Legal and Economic*, University of Turin; the Junior Corporate Law Scholar Workshop; the workshop on *Governance by technology - the revolution will not be decentralized?*, University of Amsterdam; the 6th Law & Macroeconomics Conference at Tulane University. Helpful comments by participants are gratefully acknowledged. I am grateful to Melek Redzheb for the outstanding research assistance. Usual disclaimers apply.

E-mail address: e.d.martino@uva.nl.

¹ Bob Jessop, ‘State Theory’ [2022] Handbook on Theories of Governance 77.

² Katharina Pistor, ‘From Territorial to Monetary Sovereignty’ (2017) 18 *Theoretical Inquiries in Law* 491, 495.

³ For a historical perspective on the US pathway to establish one legal tender, see David Allan Martin, *The Evolution of a National Composite Legal Tender Coinage in the United States, 1792-1860* (Syracuse University 1964).

<https://doi.org/10.1016/j.clsr.2023.105909>

Available online 27 October 2023

0267-3649/© 2023 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

the monetary base provided by the sovereign State.⁴

In history, this has not always been the case. Rather, for centuries, monetary competition has been the norm as there was no central authority so powerful to issue enough money and enforce its monopoly.⁵ And even after the establishment of such a monopoly, the control of the State over money depends on its ability to credibly constrain private actors active in the money market and on its credibility in the international arena.⁶ This move from competition to monopoly generated clear societal gains in terms of increased trust and confidence and reduced financial risk.

In modern financial systems, the creation of private money as a complement to and not in competition with public money is crucial, but it is not harmless. The Global Financial Crisis of 2008 can be understood as a failure of the State, chiefly the US, to govern the production of private money.⁷ However, if willing to do so, the State can shape and restrain the production of private money through law and regulation.⁸ On the other hand, the possibility to produce reliable and trustworthy private money also rests on law and regulation.⁹

With the advent of new, disruptive technology, it seems that history may repeat itself. Private money may not only complement but radically challenge State monetary sovereignty. While the tendency to reprivatise money is long-lasting and can be traced back to the demise of the Bretton-Wood system, the technological advancements of the last two decades fuelled this process. In particular, the advent of distributed ledger technology and the process of platformisation sparked a renewed interest in designing borderless money escaping the control of the State.¹⁰

The mind immediately goes to Libra, a project launched by Facebook and now retracted.¹¹ More generally, stablecoins aim to provide reliable and low-volatility alternatives to fiat money, especially within the economic activities run on the blockchain. As private actors have clear

⁴ See, for instance, Benjamin M Friedman, 'Money Supply' [2010] *Monetary Economics* 250.

⁵ A typical example is the emergence of the Bank of Amsterdam in the early XVII century. Before the rise of the Bank of Amsterdam, the Dutch Republic was a small open economy with 800 to 1,000 different circulating coins. Each province and many cities had official mints, while private mints, neighboring states, and counterfeiters offered competing coins. The Bank of Amsterdam outcompeted all of them and dominated the market for money for almost two centuries, acting as the key financier of the so-called Dutch Golden Age. See, Stephen Quinn and William Roberds, 'The Bank of Amsterdam and the Leap to Central Bank Money' (2007) 97 *American Economic Review* 262, 262.

⁶ On sovereign states that, de facto, have no monetary sovereignty, see Pistor (n 2) 497.

⁷ Tobias Adrian and Hyun Song Shin, 'The Changing Nature of Financial Intermediation and the Financial Crisis of 2007–2009' (2010) 2 *Annu. Rev. Econ.* 603.

⁸ Arvind Krishnamurthy and Annette Vissing-Jorgensen, 'The Impact of Treasury Supply on Financial Sector Lending and Stability' (2015) 118 *Journal of Financial Economics* 571. See also Ricardo J Caballero, Emmanuel Farhi and Pierre-Olivier Gourinchas, 'Safe Asset Scarcity and Aggregate Demand' (2016) 106 *American Economic Review* 513.

⁹ Katharina Pistor, 'A Legal Theory of Finance' (2013) 41 *Journal of Comparative Economics* 315.

¹⁰ On DLT and private money, see Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System'. On platformisation, see Orly Lobel, 'The Law of the Platform' (2016) 101 *Minn. L. Rev.* 87. On platformization and money, see Ms Valeria Ferrari, 'The Platformisation of Digital Payments: The Fabrication of Consumer Interest in the EU FinTech Agenda' (2022) 45 *Computer Law & Security Review* 105687.

¹¹ Dirk A Zetzsche, Ross P Buckley and Douglas W Arner, 'Regulating Libra' (2021) 41 *Oxford Journal of Legal Studies* 80. On the potential impact of a project like Libra on the financial system, see Philipp G Sandner and others, 'The Digital Programmable Euro, Libra and CBDC: Implications for European Banks' [2020] *Libra and CBDC: Implications for European Banks* (July 29, 2020).

incentives to control the production of money, it is reasonable to expect that further technological advancement will generate new, more refined possibilities to conceive competing private money.

To rebut this new threat, there is a widespread belief that the State should upgrade public money and offer superior services that leverage the same technological opportunities. Therefore, many jurisdictions are experimenting with Central Bank Digital Currencies (CBDC), a new form of public digital money that should squeeze out private competitors.¹² While innovations in the area of money and payments are to be welcome, the introduction of CBDC comes at a cost, for instance, in terms of data management and the stability of the financial system.¹³

In this domain, the applicable law and economic outcomes are inherently interconnected. Yet, these two worlds rarely interact in the academic debate. This article aims to bridge this gap concerning monetary sovereignty and private digital money. Building on key insights from the finance and macroeconomy literature, this article explains the risks posed by monetary competition in the digital age and highlights how such risks are, by and large, a function of the legal framework applicable to public and private money. After that, the article proposes ways for the State to retain control over money, countering the hostile takeover of monetary sovereignty that powerful private entities may soon launch. In particular, the article proposes to strictly regulate the convertibility between private and public money and enact measures that fragment the potentially borderless market for private money producers by regulation.

A disclaimer is of order before proceeding. This article does not want to take a protectionist view and shield the State power to perpetuate the *status quo*. The underlying argument is that challenges to a largely unsatisfactory *status quo* should come from democratic and participative processes rather than private entities acting as a *deus ex-machina* while promoting their own interests.

The article proceeds as follows. Section 2 describes the shift from competition to monopoly in the control of money. In doing so, it provides historical examples and analyses the relationship between public and private money once the monopoly is established. Section 3 analyses the law of private money. Section 4 unfolds the characteristics of monetary competition in the 21st century, underlying similarities in and differences with its historical precedents. Section 5 shows the risks inherent in monetary competition. Section 6 proposes two non-mutually exclusive normative approaches to counter competitive threats in the control of money.

2. Money: from competition to state control

2.1. Monetary competition and instability

In history, the examples of competition amongst different circulating money are countless and giving a full account of the development of the monetary system falls outside the scope of this contribution.¹⁴ This section focuses on providing few but crucial insights to illustrate the dynamics between public and private money, with specific reference to the evolution of the monetary system in the US as of the American Civil War, as it is paradigmatic of the disruptive effects of monetary competition.¹⁵ This historical exercise is crucial to put the discussion on the

¹² Frédéric Tronnier, Michael Recker and Peter Hamm, 'Towards Central Bank Digital Currency—A Systematic Literature Review'.

¹³ Ulrich Bindseil, 'Central Bank Digital Currency: Financial System Implications and Control' (2019) 48 *International Journal of Political Economy* 303.

¹⁴ Barry Eichengreen, *Globalizing Capital: A History of the International Monetary System* (Princeton University Press 2019).

¹⁵ For an overview of other relevant historical examples see Wilko Bolt, Vera Lubbersen and Peter Wierts, 'Getting the Balance Right: Crypto, Stablecoin and CBDC'; *ibid*; Gary B Gorton and Jeffery Zhang, 'Protecting the Sovereign's Money Monopoly' [2022] *U of Michigan Law & Econ Research Paper* 23.

digital revolution and monetary sovereignty in the right perspective, identifying recurring issues and isolating new and unprecedented challenges, if any.

In the period leading up to the American Civil War, between 1830 and 1863, the production of money in the United States was mainly private.¹⁶ The Federal Government did not issue paper money, and there was no single national currency but many different denominations of silver and gold coins. In this scenario, banks issued debt in the form of “banknotes”.

Not every State approached the production of private money equally. Eighteen States adopted a “free banking” system, whereas 15 adopted a “chartered banking” system. Chartered banking system were fairly similar to today’s regulatory framework. Banknotes could only be issued by institutions with a licence and in compliance with relevant requirements, mainly in terms of reserves. In contrast, under the “free banking” system, every institution could issue banknotes by depositing state bonds with a state regulatory agency.¹⁷

These notes were perpetual zero-coupon bonds with the possibility for the holder to redeem at par and *in speciem* only at the local bank that issued the banknote. However, the banknotes were used as a means of payment and traded, in the secondary market, with a discount.¹⁸ The most problematic aspect of the discount system – especially for free banking systems – was that the value of state bonds backing the notes varied over time, and many states defaulted on their bonds.¹⁹

In other words, the price of the notes changed, and thus the price of “private money” was subject to some level of volatility.²⁰ This made the system economically inefficient and prone to runs.²¹

A crucial moment of development arrived in 1863 when the National Banking Act established National Banks in the United States. The key breakthrough was that these banks could issue national banknotes with uniform value across the United States insofar as these were backed by US Treasury bonds.²²

However, the National Bank Act did not solve the problem of bank runs.²³ The supply of US Treasury bonds was, in fact, limited, and national banks did not want to encumber all of their stock of Treasury bonds by issuing banknotes. The scarcity of high-quality safe collateral is a crucial and recurrent topic in private money creation and, in more recent times, it has shaped the law and regulation related to the creation

¹⁶ William M Gouge, *A Short History of Paper-Money and Banking in the United States: Including an Account of Provincial and Continental Paper-Money. To Which Is Prefixed, An Inquiry Into the Principles of the System* (Philadelphia, Printed by TW Ustick 1833) 53.

¹⁷ Gary Gorton, ‘Pricing Free Bank Notes’ (1999) 44 *Journal of Monetary Economics* 33.

¹⁸ The discount rate was determined by brokers depending on the “reputation” of the issuing bank and the geographical distance Gary Gorton, ‘Reputation Formation in Early Bank Note Markets’ (1996) 104 *Journal of political Economy* 346, 353.

¹⁹ Gary Gorton, ‘The Regulation of Private Money’ (2020) 52 *Journal of Money, Credit and Banking* 21, 28. 8. There is strong empirical evidence showing that free banks tended to fail when the prices of the bonds backing their notes, and held by the state treasurer, fell. See Arthur J Rolnick and Warren E Weber, ‘New Evidence on the Free Banking Era’ (1983) 73 *The American Economic Review* 1080.

²⁰ In financial terms, the discount rate was efficiently set by the market. However, it did not guarantee the uniformity and stability of the value of money, so it turned out to be inefficient in financial terms. Gorton, ‘Pricing Free Bank Notes’ (n 17).

²¹ For a more detailed account see Dan Awrey, ‘Bad Money’ (2020) 106 *Cornell L. Rev.* 1, 11.

²² This measure was primarily aimed at financing the Civil War of the Federal State versus the Confederacy. See George T McCandless, ‘Money, Expectations, and the US Civil War’ (1996) 86 *The American Economic Review* 661.

²³ For a summary of banking panics in the US before and after the National Banking Act, see Charles W Calomiris and Gary Gorton, ‘The Origins of Banking Panics: Models, Facts, and Bank Regulation’, *Financial markets and financial crises* (University of Chicago Press 1991).

of private money.²⁴

Therefore, national notes were under-issued and could not match the market demand, so another form of private money emerged – demand deposits backed by the assets of the bank.²⁵ Thus, during panics, the runs on bank debt moved from banknotes to demand deposits.²⁶

The landing point of this story is the creation of the Federal Deposit Insurance Corporation (FDIC), established by the Banking Act of 1933 to curtail the runs generated by the Great Depression. The system has worked for a long time, limiting panics and runs in the US banking system. However, the “thirst” for creating “bad” private money did not disappear. Instead, it has taken more subtle and sophisticated forms, building up the (systemic) risk that finally erupted in the Global Financial Crisis.

From this brief and necessarily incomplete overview, it is possible to derive few important insights that will prove useful for the analysis of digital private money and the design of their regulatory regime. First, the development of the “private money industry” in the US shows the key role of confidence and reputation in a system of multiple private money issuers. Specifically, the market should rely on the general solvency of the bank and the quality of the collateral. The former is key for demand deposits, whereas the latter plays an important role when it comes to banknotes. Second, the ways in which private money is devised and offer derives from the regulatory regime applicable to the issuers of private money. Third, the scarcity of high-quality collateral incentivizes the creation of more fragile private money.

2.2. Monetary control as a cornerstone of the modern state

Competition of circulating private money proved largely unable to support social welfare over time as it could not generate reliable financial instruments acting as a store of value, unit of account, and means of payment.²⁷

The emergence of some form of monopoly in the control of circulating money is intrinsically linked with the development of the modern post-Westphalia State.²⁸ These States are at the apex of the system, recognising as equals only other sovereign States. Hence, they are apt to sit at the top of a hierarchical financial system, whereby the sovereign controls circulating money and the other participants in the financial system play according to the rules of the sovereigns.²⁹

Moreover, modern States face a “soft budget constraint”, unlike private entities.³⁰ This is also tightly linked with modern sovereignty as States, when seeking debt finance, can commit to the future productivity of their economies and their power to levy taxes. Sovereign States can become insolvent when they are exposed toward foreign exchanges, but even then, they are shielded from liquidation.³¹

Based on this premise, the money issued and controlled by the State could guarantee users’ liquidity and safety – two basic needs of individuals and firms to carry out their (risky) economic activities.³² This also means that State money is always accepted without questioning its

²⁴ See Section 3.1.

²⁵ Gorton, ‘The Regulation of Private Money’ (n 19) 26.

²⁶ Christian Brownlees and others, ‘Back to the Future: Backtesting Systemic Risk Measures during Historical Bank Runs and the Great Depression’ (2020) 113 *Journal of Banking & Finance* 105736.

²⁷ William Stanley Jevons, *Money and the Mechanism of Exchange*, vol 17 (D Appleton 1876).

²⁸ Eric Helleiner, ‘Sovereignty, Territoriality, and the Globalization of Finance’, *States and sovereignty in the global economy* (Routledge 1999).

²⁹ Pistor (n 9) 317.

³⁰ Janos Kornai, Eric Maskin and Gerald Roland, ‘Understanding the Soft Budget Constraint’ (2003) 41 *Journal of economic literature* 1095.

³¹ What Pistor calls “binding survival constraint”. See Pistor (n 2) 497.

³² Gary Gorton, ‘The History and Economics of Safe Assets’ (2017) 9 *Annual Review of Economics* 547. This does not consider asymmetric dynamics of inflation and deflation. Such simplification is necessary to maintain the analysis treatable and does not harm the generalizability of the findings.

value, which Bengt Holmstrom calls the “No Questions Asked” (NQA) principle.³³

As already discussed in the historical analysis, the relationship between private and public control of money does not usually display corner solutions, where private parties fully and freely compete for the control of money or where the State has absolute control. Rather, it envelops as a continuum with intermediate solutions. However, if there was ever a moment in history where public control over money got close to being uncontested, it was in the aftermath of WWII, with the Bretton Woods Agreements. The global monetary system was based on the gold standard, with the US dollar pegged to gold and the other main currencies pegged to the US dollar.³⁴ As a complement to this new global monetary system, States put in place controls for inflows and outbound of capital.³⁵ This, coupled with strict banking regulation, established almost absolute control over the ability of private parties to issue private money.

The demise of the Bretton Woods system has several causes not necessarily related to the private-public clash for the control of money; however, this latter point certainly helped make it too rigid and, consequently, unfit to be a long-term, stable equilibrium.

Thereafter, the pendulum swung toward a partial re-privatisation of money. This generated a more dynamic equilibrium between private and public control over money.³⁶ The development of this dynamic equilibrium depends on the relative position of public and private actors and regulation, where regulation is, at least partly, endogenously determined by the relative power of public and private parties. This new balance between private and public powers continued up until the Global Financial Crisis, confirming that the law shapes the offer of private money.

3. The law of private money

3.1. Monetary sovereignty and private money

In modern financial systems, how do public and private money co-exist? Private money exists in modern financial systems as a complement to public money which is the only form of money having legal tender status. Private money is now created under the umbrella of State law and the shadow of the State’s fiscal backstop. It is important to delve deeper into this point for two reasons. First, to understand how private digital money can take advantage of the status quo. Second, to understand how some form of digital private money can innovate the system and threaten the control of the Sovereign over money. This section looks at the role of fiscal backstopping for the issuance of private money, while [Section 3.2](#) focuses on the legal underpinnings of private money.

Since the 70 s, after the Bretton Wood demise, a more flexible monetary system based on floating rates and free capital flow arose, starting the trend of re-privatising the monetary system based on more advanced asset-backed financial instruments.

The idea behind those is simple. Private parties lack the fiscal capacity to back liquidity and safety promises. However, leveraging the law of contract and property, they can use other assets to back these promises and mimic the State’s fiscal backstop.³⁷

Asset-backed securities were initially issued only by government-

³³ Bengt Holmstrom, ‘Understanding the Role of Debt in the Financial System’.

³⁴ John Williamson, ‘On the System in Bretton Woods’ (1985) 75 *The American Economic Review* 74.

³⁵ Pistor (n 2) 499.

³⁶ Steven L Schwarcz, ‘Regulating Digital Currencies: Towards an Analytical Framework’ (2022) 102 *BUL Rev.* 1037.

³⁷ Steven L Schwarcz, ‘The Alchemy of Asset Securitization’ (1994) 1 *Stan. JL Bus. & Fin.* 133.

sponsored private agencies.³⁸ Over the years and thanks to improvements in information technologies, the practice became wide-spread, leading to the mass-scale adoption of securitisation.

These trends were crucial for the economic and financial developments of the late 20th century in Western countries. On the one hand, the growing ability of private parties to complement the State in issuing safe and liquid instruments increased dramatically the credit available to society, including the credit necessary to realise social goals, such as allowing subprime borrowers to purchase a house.³⁹ On the other hand, this ability to provide more credit by generating liquid and safe securities fuelled the exponential growth of the financial sector as the safe and liquid securities could constitute the base to back the issuance of even more credit.⁴⁰

This self-reinforcing mechanism ultimately responds to the necessity to create a larger supply of assets that are perceived as safe since those that are publicly issued are scarce, not enough to sustain the increased demand for credit.⁴¹ The availability of safe assets is indeed crucial for modern societies and therefore private parties are always incentivized to create new classes of ‘safe’ assets, especially when the supply of public safe assets is scarce.

The artificial creation of safety and liquidity is supported by law and regulation. Even more relevant, as the social gains became more evident, State regulation eased the private creation of money-like instruments. But before looking at the details of this legal construction, it is worth clarifying the risks inherent in the private creation of liquidity and safety.

Liquidity represents one of the quintessential elements to lubricate any market economy. Yet, despite its crucial role, it remains a somehow elusive concept, very difficult to define and describe, especially in its cyclical dynamics. Understanding liquidity, liquidity risk, and the role of liquidity in boosting financial crises is crucial to designing a resilient regulatory framework for private money.

Liquidity can be defined as the ability to sell any asset at will.⁴² Crucially, liquidity is not always available on demand; it is not a free good.⁴³ Rather, liquidity is volatile and tends to be particularly scarce when it is most needed, i.e., in times of financial turmoil. Therefore, the availability of liquidity is procyclical. In good times, when the economy is booming, liquidity is abundant. However, when the situation reverses, liquidity risk materialises and liquidity dries up.⁴⁴ The legal design of private money issued as short-term claims supports the procyclicality of liquidity, and this is an aspect that is still often neglected.

The production of liquid assets implies some form of liquidity transformation, whereby the liquid promise is backed by more illiquid assets. What makes financial institutions fragile and, therefore, prone to runs is the mismatch between their assets and liability.⁴⁵

Promising liquidity is essential for modern economies and, at the same time, generates sizeable risks and makes the system inherently

³⁸ W Scott Frame and others, ‘The Rescue of Fannie Mae and Freddie Mac’ (2015) 29 *Journal of Economic Perspectives* 25.

³⁹ See, for instance, Dwight M Jaffee & Kenneth T Rosen, ‘Mortgage Securitization Trends’ (1990) 1 *Journal of Housing Research* 117, 117. (‘[Securitization] has lowered mortgage interest rates and thereby raised consumer demand for housing’).

⁴⁰ Tri Vi Dang, Gary Gorton and Bengt Holmström, ‘The Information View of Financial Crises’ (2020) 12 *Annual Review of Financial Economics* 39.

⁴¹ Gorton, ‘The History and Economics of Safe Assets’ (n 32); Ricardo J Caballero, Emmanuel Farhi and Pierre-Olivier Gourinchas, ‘The Safe Assets Shortage Conundrum’ (2017) 31 *Journal of economic perspectives* 29.

⁴² Pistor (n 9) 316.

⁴³ *ibid* 317.

⁴⁴ Claudio Borio, ‘The Financial Cycle and Macroeconomics: What Have We Learnt?’ (2014) 45 *Journal of Banking & Finance* 182.

⁴⁵ This is called “Qualitative asset transformation”. Banks borrow short-term, liquid, and safe liabilities and lend long-term, illiquid, and risky assets. See John Armour and others, *Principles of Financial Regulation* (Oxford University Press 2016) 277.

fragile. Liquidity can be fully supported only by entities with the fiscal capacity to backstop the short-term and liquid promises made. Liquidity promises made by private parties and not supported by the public backstop always have a speculative component and increase the instability of the system. The quality of this promise crucially depends on the financial cycle, the quality of the collateral, and the quality of the law and regulation supporting the liquidity promise.

Safety is the second key characteristic of private money. Liquidity and safety are clearly interlinked; however, conceptually differentiating the two is useful as these refer to distinct economic rationales and are supported by different legal constructions.

An asset can be considered safe if it can be used to transact without concerns that the counterparty in the transaction has private information about its value.⁴⁶ Despite the seemingly simple definition, the nature and production of safe assets have been a constant and crucial issue that society has solved in different and increasingly sophisticated ways over time. Producing safe assets is valuable to society; however, safe assets are scarce. In this light, the creation of private money can also be seen as a response to a shortage of publicly produced safe assets, such as government debt.⁴⁷

Beyond being liquid, safe assets must also enjoy a related but separate characteristic – they must be accepted by all parties, at all times, at their face value. In other words, these must comply with the “no questions asked” (NQA) principle.⁴⁸ To this end, safe assets must be designed to be “information insensitive”, meaning that private parties should have no incentives to produce private information on the safety of these assets so that nobody fears adverse selection.⁴⁹ If the privately produced safe assets lose their information insensitivity and investors start producing private information, the rational reaction is to adjust on quantity, i.e. to run.⁵⁰

Like liquidity, the safety of financial assets must be supported by the legal system. Again, the law and the applicable regulatory framework determine how credible the promise of safety from private parties is.

The quintessential legal support to private money is the explicit or implicit State backstopping. This means that, in the event of a crisis, the promise of safety made by issuers of private money will be somehow backed by the State, dramatically increasing the credibility of such promise.⁵¹ Closely complementing State backstopping, another key legal support to private money is the provision of a permanent option of redemption. This allows the holder of private money to convert the claim into public money to ensure the interoperability between different issuers of private money and the stability of a system where private and public money co-exist.⁵²

Finally, based on all the elements discussed so far, it is possible to provide a taxonomy of money in modern economies. As said, money can be public or private. Moreover, money can be circulating or account-based. Circulating money are claims towards public or private entities that circulate as a medium of exchange. These are tokens that are negotiable by transfer alone. The transaction history of the instrument

Table 1
Taxonomy of public and private money.⁵⁴

	Private Money	Public Money
Account-Based	Money Market Funds Shares (MMF) Uninsured Deposits	Central Bank Reserves Insured Deposits
Circulating	Stablecoins	Cash

does not matter.⁵³ In contrast, account-based money are claims toward public or private entities that are settled through different accounts without the actual circulation of physical or digital tokens. In this case, the transaction history of the instrument is all that matters (Table 1).

Crucially, in modern economies, the Sovereign has the monopoly of circulating money, whereas private and public account-based money co-exist and complement each other. Public account-based money enjoys a strong backstopping and redemption option. The most typical example of account-based public money is insured bank deposits. These are, indeed, insured by deposit guarantee schemes and ultimately backed by the state. Moreover, these can be converted into cash at any time for their face value. Other account-based money, private such as uninsured deposits, repos or money market fund shares, have a more implicit backstop and a more rigorous regime for redemption and conversion into public money.

This system is currently challenged by new, technologically enabled sources of circulating private money, such as stablecoins. This can threaten monetary sovereignty, eroding State control over money. Crucially, keeping the available technology constant, the legal regime applicable to these competing circulating money defines, by and large, the outcome of the actual possibility of competing with public money. To illustrate the point, it is important to understand how the current legal regime shapes the possibility of issuing private account-based money.

3.2. Legal underpinnings of private money in modern finance

Private account-money are issued to complement public money. However, that is not sufficient to guarantee liquidity and safety. To do this, private money-makers lever the possibilities provided by the legal framework. Private money is thus created “in” law.⁵⁵

First, liquidity can be promised through the issuance of short-term financial claims. The ability to issue short-term debt depends on the ability of the issuer to grant and enforce legal entitlements to the prospective holder, which is built into modern legal systems.

Different forms of private money can display various designs, leveraging different legal configurations and entitlements. Beyond such heterogeneity of legal constructions, these all rely on the principle of freedom of contract combined with the possibility to grant proprietary rights on assets backing the short-term promise and its credibility. These contractual and proprietary rights must be strong enough to give the holder of the short-term claim the confidence that such a claim is liquid. From a legal perspective, this means that the claim can be transferred or realised at will.

This strong design of entitlement is prone to procyclicality. Debt and debt-like instruments are fixed claims vis-à-vis the issuer that can also be realised when liquidity dries up. These entitlements are not only strong but also rigid: their design does not allow for ex-post adjustments.

The strength and rigidity of these entitlements legally support the

⁴⁶ Gorton, ‘The History and Economics of Safe Assets’ (n 32).

⁴⁷ Caballero, Farhi and Gourinchas (n 8).

⁴⁸ Holmstrom (n 33) 15.

⁴⁹ Gary Gorton and Guillermo Ordoñez, ‘The Supply and Demand for Safe Assets’ (2022) 125 Journal of Monetary Economics 132.

⁵⁰ Gorton, ‘The History and Economics of Safe Assets’ (n 32) 549. This construct brings about two main consequences. First, safe assets have a “convenience yield”, meaning that holding safe assets in the portfolio brings about a value beyond the return such assets guarantee. See Dang, Gorton and Holmström (n 40).

⁵¹ In the framework by Professor Pistor finance is hierarchical and the closer one is to the apex the more elastically the law is applied. Backstopping is applied only to institutions and promises very close to the apex. Pistor (n 9) 324.

⁵² Tobias Adrian and Tommaso Mancini-Griffoli, ‘Public and Private Money Can Coexist in the Digital Age’ (2021) 41 Cato J. 225.

⁵³ Gorton and Zhang (n 15) 5.

⁵⁴ *ibid* 10.

⁵⁵ Pistor (n 2) 516.

promise of liquidity but also foster its procyclicality.⁵⁶ Consequently, so long as liquidity is abundant, the strong legal entitlements granted to the holders of short-term debt facilitate the issuance of private money. However, when liquidity dries up, the strong legal entitlements reinforce the illiquidity, boosting a crisis that damages society.⁵⁷

The liquidity risk inherent in short-term debt is tightly related to the second key characteristic of private money – safety. Again, the design of the legal entitlements attached to short-term debt is crucial for allowing private parties to credibly promise safety. To credibly promise safety, the possibility to freely design enforceable contracts and allocate property rights encumbering assets is necessary yet not sufficient. These would indeed fail to fulfil the NQA constraint when bankruptcy risk is considerably different from zero.

In fact, obligations cannot be immediately released in bankruptcy as they are subject to a mandatory stay.⁵⁸ Therefore, having collateral subject to a mandatory stay would make the value of the claim uncertain and its realisation illiquid.

Therefore, the private creation of safe assets also requires bankruptcy privileges whereby obligations supported by financial collaterals (i.e., debt backing debt) can escape mandatory stay. Nowadays, these are widespread in advanced economies and are called “bankruptcy safe harbours”.⁵⁹

This bankruptcy privilege is a relatively recent legal innovation adopted by most jurisdictions between the late 90 s and early 2000s. These reforms were justified on the ground of enhancing the liquidity and efficiency of the capital market. This reflects a new equilibrium between private money, whereby private parties engaging in securitisation got closer to the apex of the hierarchical financial system and, accordingly, benefited from favourable legal treatment.

For the purpose of this article, this brief analysis of the legal underpinnings supporting the creation of private money is important for two reasons. First, it highlights how the demand for the creation of (safe) private money, including stablecoins, is endogenous to the functioning of modern financial systems and the legal framework adapted over time in response to such demand.⁶⁰ Second, it shows how strong and rigid legal entitlements support the creation of private money and, at the same time, are procyclical and bolster liquidity risk. In the context of

stablecoins, this is particularly relevant as the design of the distributed ledger technology and the various verification protocols are thought to provide strong and rigid entitlements to holders of crypto-assets, with little to no possibility of adjustment.

4. Back to the future: monetary competition in the 21st century

4.1. Stablecoins as a global currency

The Financial Stability Board (FSB) defines stablecoins as a special category of crypto-assets that “purport” to maintain a stable value referencing physical, financial or crypto-assets (asset-linked stablecoins) or via specific protocols adjusting supply in response to a change in demand (algorithmic stablecoins). Moreover, it defines “global stablecoin” as a stablecoin with the potential to reach adoption across multiple jurisdictions and achieve substantial volume.⁶¹

From a functional perspective, stablecoins are crypto assets aiming to facilitate the transfer of funds within the blockchain.⁶² These are issued by parties who want to provide liquidity to the whole permissionless ecosystem, such as Tether, or to a closed, permissioned, one, such as Libra if the project had moved forward. Other issuers may issue stablecoin in combination to another specific crypto, making it easier to attract funds. This was the case of the Terra-Luna project.⁶³

The case of Libra is perfect to grasp the potential threat of stablecoins to monetary sovereignty. Facebook’s – now Meta – Libra project to create a global stablecoin of the same name represents the best exemplification of this discussion. Libra aimed to compete with public money by leveraging Facebook’s reputation and what was considered a trustworthy technology.⁶⁴ The Libra project has now been retracted, but the appeal of issuing circulating money for private entities and platforms is clear. This prospect should be worrisome as it has been shown that private debt can acquire “money” status by leveraging reputation and technology.⁶⁵ Crucially, the liquidity and safety promises of private debt do not need to be absolute for it to be accepted as a money instrument, no questions asked. Generating reliability and trustworthiness is sufficient to climb the hierarchy ladder of the financial system and get close to the apex, thus, increasing the de facto implicit guarantee of the Sovereign to backstop such promises.⁶⁶

This may appear as nothing new since it has already happened in history, as shown in Section 2. However, there is a key difference. In modern financial systems, private money is made “in law”, by leveraging the possibilities provided by the legal system.⁶⁷ This guarantees the possibility of allocating control over money to the Sovereign State, ending the monetary competition era. Stablecoins also leverage the possibilities provided by the legal system and technology that, by design, has some degree of tamper resistance to outside control, including that of the State.⁶⁸

⁵⁶ In the aftermath of the Global Financial Crisis, both legal and economic scholarship engaged in a lively debate about countercyclical law and regulation. For a broad account of such literature, see Jonathan S Masur and Eric A Posner, ‘Should Regulation Be Countercyclical’ (2017) 34 *Yale J. on Reg.* 857.; Yair Listokin, ‘Law and Macroeconomics: The Law and Economics of Recessions’ (2017) 34 *Yale J. on Reg.* 791.

⁵⁷ Markus K Brunnermeier, ‘Deciphering the Liquidity and Credit Crunch 2007-2008’ (2009) 23 *Journal of Economic Perspectives* 77. This latter remark highlights a fundamental trade-off between investor protection through strong legal entitlements and financial stability. This goes against the original hypothesis developed by the “Law and Finance” literature, according to which investor protection directly and strongly correlates with social welfare. See Rafael La Porta and others, ‘Law and Finance’ (1998) 106 *Journal of political economy* 1113. Since then, the law and finance movement has evolved enormously, acknowledging the merits but also the many limitations of the investor protection argument. See, among many, AM Paces, ‘Why Investor Protection Is Not All That Matters In Corporate Law and Economics’ (2009) 6 *The Icfai University Journal of Corporate and Securities Law* 8.; Pistor (n 9) 325.

⁵⁸ Mandatory stay refers to those provisions that ensure that creditors cannot collect debts from a debtor who has declared bankruptcy. For a comparative overview, see Stijn Claessens and Leora F Klapper, ‘Bankruptcy around the World: Explanations of Its Relative Use’ (2005) 7 *American Law and Economics Review* 253.

⁵⁹ Philipp Paech, ‘The Value of Financial Market Insolvency Safe Harbours’ (2016) 36 *Oxford Journal of Legal Studies* 855.

⁶⁰ This mechanism parallels the “financial instability hypothesis” formulated by Minsky, whereby financial crises are endogenously generated by the internal dynamics of the system. See Hyman P Minsky, ‘Stabilizing an Unstable Economy’ [1986] *Yale UP, New Haven*.

⁶¹ FSB Financial Stability Board, *Regulation, Supervision and Oversight of “Global Stablecoin” Arrangements: Final Report and High-Level Recommendations* (Financial Stability Board 2020) 5.

⁶² Sirio Aramonte, Wenqian Huang and Andreas Schrimpf, ‘DeFi Risks and the Decentralisation Illusion’ [2021] *BIS Quarterly Review* 21, 24.

⁶³ Antonio Briola and others, ‘Anatomy of a Stablecoin’s Failure: The Terra-Luna Case’ (2023) 51 *Finance Research Letters* 103358.

⁶⁴ Markus K Brunnermeier, Harold James and Jean-Pierre Landau, ‘The Digitalization of Money’ (National Bureau of Economic Research 2019) 6. See also Jesús Fernández-Villaverde and Daniel Sanches, ‘Can Currency Competition Work?’ (2019) 106 *Journal of Monetary Economics* 1, 2.

⁶⁵ Gary B Gorton, Chase P Ross and Sharon Y Ross, ‘Making Money’ (National Bureau of Economic Research 2022).

⁶⁶ Pistor (n 9) 323.

⁶⁷ Pistor (n 2) 517.

⁶⁸ With a parallel argument, the point of digital currencies being structurally ‘less susceptible to failure’ has also been advanced by Brunnermeier, James and Landau (n 64) 24.

Bringing together these two latter arguments shows the real threat the Stablecoins can bring about to monetary sovereignty. Stablecoins can get in a position where State backstopping is considered likely because of their importance in the system and interconnection with the rest of the economy while being, at least partly, shielding by the State intervention.

To properly understand the channels through which stablecoins can pose a threat to monetary sovereignty, it is important to introduce the two key design features of stablecoins: the stabilization mechanisms and the collateralization.

The first key design feature of stablecoins is stabilisation. To understand the financial stability concerns and the regulatory implications of stablecoins, one must consider three aspects of stabilisation: the peg, the stabilisation mechanisms, and the collateralisation.⁶⁹ The first salient choice in the design of a stablecoin is the peg, i.e., the currency or basket of assets that the stablecoin aims to replicate. Currently, most stablecoin projects use the US dollar as a peg as it is widely considered a stable store of value worldwide. The second crucial design feature is the stabilisation mechanism. Broadly speaking, there are two mechanisms to stabilise the price of the coin and match the peg: physical reference and algorithmic-based stabilisation.

Stabilising a coin through physical reference means that the issuer holds reserves backing the value of the stablecoins. In contrast, algorithmic stabilisation is based on the idea of automatically adjusting the supply of coins to match the peg through an algorithm and to guide the user's expectation of the future value of such coins.⁷⁰ Functionally, this looks much more like a "private" central bank, so much so that the proponents of this type of stablecoins labelled their projects as "algorithmic central banks".⁷¹ Potentially, this represents an even bigger threat to State control over money; however, at this technological iteration, algorithmic stablecoins are still unable to reliably promise stability.⁷²

The second last key design element for a stablecoin is collateralization. More specifically the type, quality and amount of collateral backing the promise of value stability of the stablecoin. The quality and the amount of reserves are crucial in shaping financial stability risk as these elements define the level of liquidity transformation performed by the issuer. Stablecoins can be backed by the same fiat of the peg, for instance, the US Dollar, by a basket of various currencies, commodities, and financial instruments, or even by a basket of crypto assets. This latter possibility makes the stabilisation mechanisms completely on-chain, as reserves are held in the same blockchain where the coins are issued, without resorting to off-chain methods like bank custody. In this case, stablecoins are usually overcollateralised to hedge the volatility of the crypto assets. Once again, such an on-chain stabilisation is too far-fetched at this stage of technology; however, it has the potential to threaten monetary sovereignty more seriously than a stablecoin with off-chain stabilisation, as it is more difficult to regulate and control.

The crucial issue is that, unlike other private money, stablecoins are actually circulating money that competes with circulating public money.

⁶⁹ Amani Moin, Kevin Sekniqi and Emin Gun Sirer, 'SoK: A Classification Framework for Stablecoin Designs', *Financial Cryptography and Data Security: 24th International Conference, FC 2020, Kota Kinabalu, Malaysia, February 10–14, 2020 Revised Selected Papers 24* (Springer 2020).

⁷⁰ Dirk Bullmann, Jonas Klemm and Andrea Pinna, 'In Search for Stability in Crypto-Assets: Are Stablecoins the Solution?' [2019] ECB Occasional Paper n. 230.

⁷¹ See, for instance, Max Raskin and David Yermack, 'Digital Currencies, Decentralized Ledgers and the Future of Central Banking', *Research handbook on central banking* (Edward Elgar Publishing 2018).

⁷² In this regard, the crash of Terra, the largest algorithmic stablecoins, in May 2022 is a case in point. See Shahaf Bar-Geffen, 'What Can Other Algorithmic Stablecoins Learn from Terra's Crash?' (*Conitelegraph*) <<https://coinitelegraph.com/news/what-can-other-algorithmic-stablecoins-learn-from-terra-s-crash>> accessed 17 April 2023.

Practically speaking, the price of a good is expressed in dollars, euros, or other sovereign currencies. It cannot be expressed in money market fund shares or deposit claims. Individuals can transact via the bank using their deposits, by swapping money market funds (MMFs) shares or by easily liquidating those forms of private money and perfecting the transaction with cash. On the other hand, the price of the same good can be expressed in USD Tether and settled using such digital currency.⁷³

4.2. Stablecoins v. CDBC

The rise of new, digital, money increased the competitive pressure on Sovereigns and triggered a renewed interest in making public money and payment infrastructures more efficient. Following this approach, more efficient public money and payment infrastructure would outcompete private currencies, safeguarding monetary sovereignty.⁷⁴ In this domain, the adoption of Central Bank Digital Currencies (CBDC) is at the top of the academic and regulatory debate.⁷⁵

CDBCs promise to increase the efficiency of the monetary system and this is, of course, to be welcomed. However, the adoption of CDBC may hamper financial stability and may not necessarily achieve the goal of outcompeting private digital money and safeguarding monetary sovereignty.

The benefits of introducing CBDC mainly pertain to the increased efficiency in payment systems and the possibility for central banks to better and more easily transmit monetary policy.⁷⁶ However, to seize these benefits, CBDC must be widely adopted by individuals, and several pieces of research on technology adoption show that this is not to be taken for granted.⁷⁷

The design of the CDBC is crucial in this respect, as it must be appealing to guarantee adoption.⁷⁸ The CDBC design is what determines how the various trade-off are settled, including the possibility to outcompete digital private money.

A thorough discussion of the relevant dimension for the acceptance of the new technology by individuals falls out of the scope of this analysis and is prone to several conjectures, as CDBCs have not been adopted on a large scale by any country. However, to make CBDC appealing, it should guarantee high interoperability with large platforms.⁷⁹ Therefore, the acceptance of CBDC and potential private money operating in these platforms seem correlated. Therefore, it is not a surprise that in one of the iterations of the Libra White Paper, the Libra Association welcomed the introduction of CBDC with a high level of integration and interoperability.⁸⁰

Some authors went even further, proposing to fully exploit the

⁷³ For a similar argument, see Gorton and Zhang (n 15) 13.

⁷⁴ Hilary J Allen, '\$= Euro= Bitcoin' (2016) 76 Md. L. Rev. 877, 928.

⁷⁵ See, for instance, Seraina Grünenwald, Corinne Zellweger-Gutknecht and Benjamin Geva, 'Digital Euro and ECB Powers' (2021) 58 Common Market Law Review 1029.

⁷⁶ Florian Böser and Hans Gersbach, 'Monetary Policy with a Central Bank Digital Currency: The Short and the Long Term' [2020] CEPR Discussion Papers DP15322.

⁷⁷ Michiel Bijlsma and others, 'What Triggers Consumer Adoption of CBDC?' [2021] De Nederlandsche Bank Working Paper; Janet Hua Jiang, 'CBDC Adoption and Usage: Some Insights from Field and Laboratory Experiments' (Bank of Canada 2020).

⁷⁸ Itai Agur, Anil Ari and Giovanni Dell'Ariccia, 'Designing Central Bank Digital Currencies' (2022) 125 Journal of Monetary Economics 62.

⁷⁹ Brunnermeier, James and Landau (n 64) 15.

⁸⁰ "Moreover, our hope is that as central banks develop central bank digital currencies (CDBCs), these CDBCs could be directly integrated with the Libra network, removing the need for Libra Networks to manage the associated Reserves, thus reducing credit and custody risk. As an example, if a central bank develops a digital representation of the US dollar, euro, or British pound, the Association could replace the applicable single-currency stablecoin with the CDBC". See the direct quote from the ECB, 'Report on a Digital Euro' (2020) 12.

positive synergies between publicly issued CBDC and stablecoins, promoting a proper public-private partnership to this end.⁸¹ Based on the arguments presented so far, it is simple to discard this radical approach as it overlooks the challenges it poses to monetary sovereignty and, more generally, the delicate relationship between public and private money in modern finance. However, this represents a coherent proposal if the wide adoption of digital money and the enhanced efficiency of the payment and monetary systems are the primary regulatory goals pursued.

More generally, it is important to highlight that introducing CBDC will change the current equilibrium between private and public money. As discussed, this equilibrium is utterly imperfect, so positive changes are possible and welcomed. However, it may also change it for the worst, depending on the CBDC design, as shown by the previous discussion on technology adoption and interoperability. Another relevant aspect is the impact of specific CBDC design on “traditional” financial intermediaries and the stability of the “traditional” financial system. The details are discussed in [Section 5.1.2](#); however, it is intuitive to notice that introducing widely available CBDC will impact financial intermediation, and it can challenge the social benefits it generates.

The introduction of CBDC may be one of the tools that brings about beneficial effects in countering the threat coming from private digital money. However, this largely depends on its design, and there seem to be trade-offs involved in terms of technology adoption and disruption of the “traditional” financial system, whose regulation should be largely redesigned.⁸²

This article contends that when designing CBDC, regulators should disregard the competitive pressure of digital private money. The design of CBDC should focus on seizing the benefits it can bring in terms of payment efficiency and monetary policy perspective while preserving the stability of the financial system. In fact, the competitive threat of digital private money is better handled through alternative legal channels. [Section 5](#) discusses the perils inherent in monetary competition by private digital money, and [Section 6](#) proposes legal tools that are superior in countering the threat to monetary sovereignty.

5. The perils of monetary competition by stablecoins

Monetary competition makes the financial system unstable, and this represents the key rationale for regulating private money. This section discusses two main sources of instability brought about by stablecoins. First, [Section 5.1](#) details the threat to financial stability prompted by private digital money, focusing on the specificities of stablecoins compared to previous experimentations with circulating private money. Second, global stablecoins bring about a new challenge in terms of shock propagation which is discussed in [Section 5.2](#).

5.1. Financial stability threat

5.1.1. Stablecoins and financial stability

The financial stability risk raised by stablecoins is largely a function of their technological design features and applicable law. This section focuses on the economic mechanisms underpinning the design of stablecoins, highlighting their inherent risk.

The analysis focuses on two aspects. First, the liquidity risk inherent to stablecoins. Second, the potential role of stablecoins as perceived “safe assets” inside and outside the crypto economy. Both liquidity and safety resonate with the historical examples discussed in [Section 2](#) and

⁸¹ Christian Catalini and others, ‘From Stablecoins to CBDCs: The Public Benefits of a Public-Private Partnership’ [2021] Available at SSRN 3986192.

⁸² For the case of European Banking Regulation, see Iris HY Chiu and Christian Hofmann, ‘Unlimited Central Bank Digital Currency: The Case for a Public Good in the Euro Area and Its Regulatory (and Deregulatory) Implications for Modern Finance’ [2023] North Carolina Journal of International Law, Forthcoming.

the analysis for digital coin and for old bank notes is very similar.

The discussion on the liquidity risk of stablecoins revolves around the stabilisation mechanism. For coins that rely on a physical reference mechanism, there is a clear functional resemblance between stablecoins and money market fund shares.⁸³ A stablecoin pegged to US Dollars purports to guarantee the stability of the value of the coin at 1\$. Such promise is backed by a basket of instruments that may include but are not limited to USD. Holders can redeem the coin and convert it into the pegged fiat depending on their legal entitlements, ideally on demand. The stability risk increases as the illiquidity of the basket of reserves increases and the stronger the redemption rights of coin holders are.⁸⁴

The discussion is radically different for algorithmic stablecoins, where the activity of creating and destroying coins is more similar to the monetary activities of modern central banks. However, at this technological stage, the algorithm lacks the reputational capacity of modern central banks as well as the fiscal backstop provided by the State, so the first attempts with algorithmic stablecoins were limited in the volume of coins created with a high probability of default due to a sudden loss of confidence.⁸⁵

However, contingent on the development of the technology and the growth of blockchain-based economic activities, both in size and user number, algorithmic stablecoins could represent the most disruptive innovation in terms of control of the monetary supply.

The second key characteristic of stablecoins is their perceived safety. In this regard, stablecoins perform a threefold service. First, they allow DeFi users to avoid converting from and to fiat money, leaving funds locked in the blockchain. Second, and consequently, they are the perfect bridge between crypto and traditional financial systems. The third characteristic is again consequential to the previous ones: stablecoins are increasingly perceived as a “safe asset” for the crypto economy, a “flight to” asset to hedge the volatility of other crypto tokens, and a medium of exchange to increase the liquidity of the crypto economy as a whole. Given this role, it is no surprise that many DeFi applications are already engaging in a form of secured lending, whereby they borrow stablecoins against high interest rates, de facto encumbering stablecoins. Once again, encumbering “safe” assets is nothing new and can become particularly problematic in times of market illiquidity and incentivise runs.

The perception of stablecoins as “safe” assets for the cryptoeconomy entails a further drawback. In times of high crypto volatility, one can expect stablecoins to be a “flight to” asset. This, in and of itself, can be considered beneficial for the stability and liquidity of the coins, as it means that in times of stress, resources are flowing to stablecoins. However, to maintain the stability of the value, in times of high demand, the supply of stablecoins should increase to accommodate the incoming resources. In turn, this may increase liquidity mismatch considerably since stablecoin issuers may face a shortfall of high-quality reserves. Going back to the historical examples, this mechanism is similar to the vicious circle triggered by the shortage of national and federal bond – high quality collateral – that incentivized the use of lower quality collateral for the creation of private money.⁸⁶

From a wider perspective, this also makes stablecoins more central in the (crypto)financial system, concentrating its risks and moving closer to

⁸³ Edoardo D Martino, ‘Regulating Stablecoins as Private Money. A Critical Take on the EU Proposal between Liquidity and Safety’ [2022] A Critical Take on the EU Proposal between Liquidity and Safety (August 30, 2022). For a similar argument see also Gary B Gorton and Jeffery Zhang, ‘Taming Wildcat Stablecoins’ (2021) 90 University of Chicago Law Review.

⁸⁴ This construction mirrors that of Money Market Funds, see Martino (n 83) 42.

⁸⁵ Russell Wong and others, ‘Why Stablecoins Fail: An Economist’s Post-Mortem on Terra’ (2022) 22 Richmond Fed Economic Brief.

⁸⁶ Text to note 47.

the apex in the finance hierarchy.⁸⁷ According to Pistor's framework, this increases the likelihood of an "elastic" application of the law and government backstopping of stablecoins, especially if these increase their interconnection with the real economy. While the backstop of private money by the State is not uncommon, stablecoins are not account-based money deriving their legitimacy from and complementing public money. Rather, they are competing with circulating money. Allowing this form of money to move toward the apex of the financial system would considerably threaten monetary sovereignty. Even more so in times of crises, when the probability of public backstop increases. This means that if stablecoins can gain a degree of centrality in the financial system, their inherent fragility will not only be a financial stability concern but will also erode the State's control over money.

5.1.2. CBDC design and financial stability

There is also a more indirect channel for monetary competition to impact financial stability. Imagine the threat to monetary sovereignty is perceived as serious, and States decide to react by offering CBDC with an "appealing" design to credibly try to outcompete private stablecoins. As discussed before, it is unclear whether this would allow it to effectively outcompete private money.⁸⁸

Moreover, and perhaps more importantly, CBDC impacts the traditional financial system. The exact configuration of such an impact is uncertain, and the existing literature points out both potentially positive and negative effects.⁸⁹ This ambiguous status of the literature is understandable since all the contributions are based on some degree of speculation in this phase. However, the relevance of the technological and financial design of CBDC is invariant in all the existing analyses.⁹⁰

The potential threats to financial stability prompted by CBDC are twofold. First, CBDC may facilitate and incentivise runs from traditional banks and other financial institutions in times of stress, as a run would become easier and safer.⁹¹ Moreover, CBDC may decrease the quantity of credit available as bank qualitative asset transformation would become more complex. This would result in bank disintermediation, increased funding costs for banks, and, consequently, more expensive credit and the risk of adverse selection in lending decisions.⁹² Overall, all these side effects increase banks' incentives to engage in excessive risk-taking over the cycle, increasing the probability of a systemic crisis.

A thorough exploration of all the possible designs of CBDC and their implications for financial stability and monetary competition is beyond the scope of this contribution. However, it is possible to consider two stylised and extreme designs, an "aggressive" and a "conservative" one. This will help clarify the threat that appealing and aggressive designs of CBDC can pose to financial stability.

On the one hand, an "aggressive" CBDC can be a cash-like circulating

token that each individual can use unlimitedly to store value and discharge payments in all relevant payment infrastructures and online platforms.⁹³ On the other hand, a "conservative" CBDC can be designed as account-based money that retailers can access only through authorised intermediaries.⁹⁴

The first, more aggressive design of CBDC should be preferred if the ultimate goal of a CBDC is to outcompete private alternatives. However, it is also evident that such a design threatens financial stability as it disintermediates banking and makes the system more prone to runs. In contrast, the more conservative design may well realise efficiency gains in managing the payment infrastructure and improve bank stability at the margin. However, it does little to incentivise the adoption of the CBDC and counter the competitive threat of private alternatives. The trade-off inherent in the design feature of CBDC is now even more clear.

However, balancing out this trade-off is unnecessary, as policy-makers should not factor in stablecoin competition when designing CBDC. In contrast, the only relevant variables should be preserving financial stability and making monetary policy and payment infrastructure more efficient.

The potential competitive pressure from circulating private money, such as stablecoins, should instead be dealt with through alternative legal and regulatory channels preventing stablecoins from reaching the apex of the financial system.

5.2. Optimum (digital) currency areas

So far, this article has considered the threat to the monetary sovereignty of a single State. This static approach is linked to the traditional understanding of sovereignty – including monetary sovereignty – as linked to a specific geographical territory.⁹⁵ In contrast, digital money is borderless and, if adopted here, by design, a global reach transcending physical geographical borders. This is likely to generate benefits thanks to the increased trade. However, based on the framework depicted so far, this is not immune from risks as shocks are more easily spread.

Once again, this is not an unprecedented issue, but the digital component innovates it considerably. Economists have long discussed the optimum currency area (OCA) to determine the geographical area that would benefit from sharing a single currency despite State borders.⁹⁶ This section aims at providing some analytical guidelines to understand the impact of the global reach of digital money.

For traditional public currencies, the Nobel laureate Robert Mundell developed four key criteria to determine an OCA. Countries in the same OCA should have (1) integrated labour markets; (2) openness of the economies, with capital mobility and flexibility in pricing and wages; (3) channels for mutualisation and redistribution, chiefly via fiscal policies; (4) similar business cycles to avoid the propagation of asymmetric shocks.⁹⁷

Before moving forward with the analysis, it is important to highlight

⁸⁷ Pistor (n 9) 323.

⁸⁸ Text to note 79.

⁸⁹ For a comprehensive review of the impact of adopting CBDC, see Sebastian Infante and others, 'The Macroeconomic Implications of CBDC: A Review of the Literature'.

⁹⁰ Agur, Ari and Dell'Ariccia (n 78).

⁹¹ Florian Böser and Hans Gersbach, 'Monetary Policy with a Central Bank Digital Currency: The Short and the Long Term'. Other articles argue that financial stability would not be impacted or would even increase. Once again, the design of the CBDC and the policies surrounding its issuance are the key variables. For instance, Brunnermeier and Niepelt argue that including a pass-through policy of the central bank to private banks in case of a digital run would preserve financial stability. See Markus K Brunnermeier and Dirk Niepelt, 'On the Equivalence of Private and Public Money' (2019) 106 *Journal of Monetary Economics* 27.

⁹² Sandner and others (n 11) 8; Ramón Adalid and others, 'Central Bank Digital Currency and Bank Intermediation' [2022] ECB Occasional Paper 28. On the reduction of bank profitability and the risks it can generate, see Toni Ahnert and others, 'Central Bank Digital Currency and Financial Fragility' (Tech rep, mimeo 2020).

⁹³ Jonathan Chiu and Seyed Mohammadreza Davoodalhosseini, 'Central Bank Digital Currency and Banking: Macroeconomic Benefits of a Cash-like Design' (Bank of Canada Staff Working Paper 2021). One could think of even more appealing and aggressive designs where CBDC bear positive interest rates. See for instance, Agur, Ari and Dell'Ariccia (n 78) 64.

⁹⁴ See the discussion in Raphael Auer and Rainer Böhme, 'The Technology of Retail Central Bank Digital Currency' [2020] BIS Quarterly Review, March 93. Again, one could think of even a more conservative approach, whereby CBDC are only a wholesale instrument for settlement between financial institutions. See Raphael Auer, Giulio Cornelli and Jon Frost, 'Rise of the Central Bank Digital Currencies: Drivers, Approaches and Technologies' 3.

⁹⁵ Pistor (n 2) 502

⁹⁶ This discussion was particularly heated in the period leading up to the adoption of the Euro. See, for instance, Ronald McKinnon, 'Optimum Currency Areas and the European Experience' (2002) 10 *Economics of Transition* 343.

⁹⁷ Robert A Mundell, 'A Theory of Optimum Currency Areas' (1961) 51 *The American economic review* 657.

that Mundell's framework is useful to offer guidelines as to when geographical or digital areas could benefit from a shared currency. In other words, it provides analytical tools to highlight the relevant trade-offs. In contrast, deriving precise normative implications as for which area should share their currencies has proven impossible to operationalize.⁹⁸

Mundell's framework is not directly adaptable to digital money. Therefore, it needs to be tweaked to capture the challenges posed by the global reach of private digital money and define optimum digital currency areas (DCA).⁹⁹ Digital currency areas can be defined as networks where payments and transactions are made digitally by using a currency that is specific to that network.¹⁰⁰ The scope of the network defines the DCA, and as networks can feature inter-operability, DCAs can become significantly wider and overlap. To the limit, if everything works smoothly, the scope of these networks is global.

Mundell's criteria still provide useful guidance to derive optimum DCA. However, the first two criteria, labour and capital mobility, are not particularly relevant as these impose much lower constraints in the digital world. In contrast, the third and fourth criteria, having channels for mutualisation of losses and having similar business cycles, are ever more important in the digital world.

Channels for mutualisation, such as fiscal policies, are crucial to ensure fairness amongst the various, physical or digital, areas as there will be uncompensated transfers of wealth resulting from adopting the same currency. However, this tightly intertwines with monetary sovereignty and is not available for privately issued digital currencies. Indeed, this can incentivise private issuers to enlarge a DCA too much, as they do not bear the political and financial burden of mutualisation.

A similar argument can be proposed for the fourth criterion, having similar business cycles to restrain the propagation of asymmetric shocks. Once again, the private incentives to issue digital money depart from social welfare consideration, as the issuer of money only bears a fraction of the shock.

From the arguments proposed so far, it is possible to infer that DCAs are likely to be wider than optimum as private issuers only gain from increased trade in their network but bear only a fraction of the burden related to redistribution and propagation of asymmetric shocks.¹⁰¹

Another key difference between digital and physical currency areas is the spatial dynamics at play. On the one hand, physical currency areas in modern times are inherently linked with State sovereignty, and the dynamic at play is to widen the currency area beyond state borders, as happened with the adoption of the Euro. This implies considerable, often insurmountable, political costs and switching costs.¹⁰²

⁹⁸ See, for instance, Hyoungh-kyu Chey, 'A Political Economic Critique on the Theory of Optimum Currency Areas, and the Implications for East Asia' (2009) 32 *World Economy* 1685.

⁹⁹ Others approached the matter similarly, looking at the optimal scope of cryptocurrencies. See John Marthinsen and Steven Gordon, 'A Theory of Optimum Cryptocurrency Scope' (2021) 30 *Economics of Innovation and New Technology* 183.

¹⁰⁰ Brunnermeier, James and Landau (n 64) 19.

¹⁰¹ This element is not entirely new and specific to Digital Money. Charles Goodhart already expressed his concerns about the risks of focusing too much on the cost minimization, disregarding the key issues of monetary sovereignty in designing currency areas. See Charles AE Goodhart, 'The Two Concepts of Money: Implications for the Analysis of Optimal Currency Areas' (1998) 14 *European journal of political economy* 407. Other authors pointed out that issuers of digital currencies with wide reach will not be able to respond optimally to heterogeneous macroeconomic dynamics, with the potential to generate hyper-inflationary events, see Grégory Claeys, Maria Demertzis and Konstantinos Efstathiou, 'Cryptocurrencies and Monetary Policy' (Bruegel Policy Contribution 2018).

¹⁰² Kevin Dowd and David Greenaway, 'Currency Competition, Network Externalities and Switching Costs: Towards an Alternative View of Optimum Currency Areas' (1993) 103 *The Economic Journal* 1180.

On the other hand, global outreach is inherent in the design of digital money, especially considering the increasingly more available and cheaper possibilities to build wider and interoperable networks. This implies that not only do private parties have incentives to set DCAs that are too wide, but also that this is easy and relatively cheap to do.

All these aspects reinforce the overall argument of the article: digital money has the potential to reach the apex of the global financial system, largely escaping the control of sovereign States over the creation of money. While this can generate some efficiency gains in good times, it also raises considerable concerns, as discussed in this section. These concerns are ever more concerning when put in the context of a hierarchical financial system where the actors close to the apex enjoy a somehow laxer existence constraint because of the implicit guarantee of their solvency provided by the State.¹⁰³

6. The efficiency of "Inefficient" law

The main threats posed by monetary competition in the digital age are those to increase financial instability and easily propagate asymmetric shock. This is particularly worrisome as sovereign States would lose control over the production of money, so this increased instability and easy shock propagation would have to be faced reactively. In contrast, the preventive control of the State over the issuers of private digital money would be limited. This, in turn, is likely to generate moral hazard.

In history, similar problems have been solved by imposing a monopoly on the creation of circulating money, but the technical specificities of digital money suggest that this is not a walkable path. In the same fashion, actively engaging in monetary competition, trying to outcompete private digital money, is unwarranted, as it may not achieve the intended result and prompt severe unintended consequences.

However, financial systems are and remain legally constructed.¹⁰⁴ Therefore, digital money is also subject to the legal construction of the financial system, despite the technological properties making them partly tamper-resistant to outside interventions.

The proceeding of this section proposes two legally based, seemingly inefficient solutions to limit the competitive threats of private digital money. The aim of these proposals is to seize the possible efficiency gains that those can bring about under the umbrella of the law and of State monetary sovereignty while preventing the most problematic consequences in terms of financial stability, shock propagation and, ultimately, democratic decision making.

6.1. Regulating convertibility

Private money needs the option to convert into fiat to be credible.¹⁰⁵ This constraint for digital money is relaxed because of its technological design. However, it is still paramount to climb the ladder of the financial system and get close to its apex, with all the benefits that come with it in terms of implied backstopping and elasticity of the law.¹⁰⁶

Before delving into the details of convertibility regulation for digital money, it is important to underline that regulating convertibility does not simply relate to the provision of a full backstop of a claim by the State. This is the case, for instance, of insured deposits, whereby the State explicitly guarantees the convertibility of these claims into fiat, at

¹⁰³ Pistor (n 9) 323.

¹⁰⁴ *ibid* 325.

¹⁰⁵ Perry Mehrling, *The New Lombard Street: How the Fed Became the Dealer of Last Resort* (Princeton University Press 2010).

¹⁰⁶ Pistor (n 9) 320. On the key role of convertibility in regulating disintermediated finance, see Fatjon Kaja, Edoardo D Martino and Alessio M Paces, 'FinTech and the Law and Economics of Disintermediation', *Routledge Handbook of Financial Technology and Law* (Routledge 2021) 92.

face value and at all times.¹⁰⁷

However, other types of private money were able to gain an implicit safety net from the State by leveraging private law provisions.¹⁰⁸ The recent history of the financial system is plenty of these examples: from asset-backed securities to repos, from asset-backed commercial papers to money market funds shares. All these instruments never enjoyed an explicit backstop; however, their construction allowed them to climb the ladder of the financial system, getting close to the apex and, consequently, being consistently helped and often bailed out in times of crisis.¹⁰⁹

Regulating convertibility for digital money means preventing them from climbing the ladder of the financial system. The result would be to keep them unstable while ignoring the fact that such instability generates systemic events.¹¹⁰

The regulatory designation attached to digital private money is the main path to effectively regulating convertibility. Indeed, stablecoins are forged in technology but are still minted in law. Hence, the State can assign them a place in the hierarchical financial system, keeping them away from the apex or, conversely, providing instruments to climb the ladder.

As evidenced earlier in the article, liquidity and safety are the two crucial elements of private money.¹¹¹ Regulating convertibility means, first and foremost, regulating stablecoins' liquidity and safety. Therefore, holders of stablecoins should not be over-entitled with strong and rigid rights. More specifically, it should not be possible to grant them withdrawal rights at all times according to mechanisms that effectively mimic redemption at par in good times. Moreover, and perhaps more importantly, they should not be able to benefit from bankruptcy benefits allowing them to provide safety and liquidity in times of crisis. In other words, stablecoins can be means of payment if parties wish so, but they cannot become a reliable alternative to store value.

Furthermore, the State should prevent licensed payment systems from settling claims in stablecoins or discharging obligations due to the State, chiefly taxes, with stablecoins. In other terms, stablecoins can be means of payment amongst private parties but cannot be a widely recognised unit of account.

At this point, one may claim that a ban would simply and effectively achieve the desired goals without setting in place complex and costly regulatory infrastructure. However, the ban option does not seem to be a viable solution for two reasons. First, if effectively regulated, digital money can generate efficiency gains, ameliorating the pain points of the existing payment infrastructures. Second, a regulatory ban would most

¹⁰⁷ Armour and others (n 45) 280.

¹⁰⁸ Text to note 55.

¹⁰⁹ Money market funds regulation is the most telling example showing how the law can shape the possibility of converting these instruments into fiat. In the pre-2008 regimes, most MMFs could offer constant net asset value conversion with relative ease, which is equivalent to pegging a coin to a fiat currency. However, after 2008 regulatory regimes changed on both sides of the Atlantic, the possibility to offer a Constant Net Asset Value now depends on the type of licence the fund possesses and the constant abidance by a series of stringent requirements. Conversely, should the fund lack the necessary licence or fail to abide by those requirements, the law governs convertibility differently. In this sense, convertibility and the associated liquidity risks are a legal construction. On the MMF regulation and its functional resemblance to stablecoins, see Martino (n 83) 16.

¹¹⁰ Many have argued against this stance, claiming that the stablecoins' stability should be guaranteed by the State to seize potential efficiency gains. See, for instance, Claeys, Demertzis and Efstathiou (n 101) 9; Arthur E Wilmarth, 'It's Time to Regulate Stablecoins as Deposits and Require Their Issuers to Be FDIC-Insured Banks' [2021] GWU Legal Studies Research Paper 2022.

¹¹¹ Text to note 41.

likely be ineffective and potentially counterproductive. The most notable example of a ban imposed on cryptocurrencies is that of China, where crypto activities have been completely banned since 2018.¹¹² However, research shows that despite the ban, the level of crypto adoption in China remains high, suggesting that it is either ineffective or loosely enforced.¹¹³ Moreover, and more importantly for the purpose of this article, the Hangzhou Internet Court recognised Bitcoin as virtual property.¹¹⁴ Therefore, the ban falls on crypto activities, such as Initial Coin Offerings or Crypto Exchanges, whereas the ownership and circulation of these virtual assets remain safeguarded by the general provisions of private law.

Lately, few jurisdictions have proposed and enacted new legislation on stablecoins and their issuers. The two most notable examples are the EU and the UK.¹¹⁵ These jurisdictions take a very different approach to stablecoin regulation, driven by divergent policy priorities. However, both overlook the financial stability and monetary sovereignty issues at stake.

The recently passed the Market in Crypto Asset Regulation is the most far-reaching and encompassing piece of legislation on crypto activities.¹¹⁶ The European legislator has decided to build a whole new regulatory framework for crypto activities, aiming at becoming the world leader in crypto asset regulation.¹¹⁷

The regulation of stablecoins is a centrepiece of the legislative initiative with a specific focus on investor protection.¹¹⁸ Therefore, investors are always entitled to withdraw or redeem their coins.¹¹⁹ Even if such redemption is promised at market value and not at par, the technological and legal construction of stablecoins generates an expectation of safety and liquidity in good times, which would trigger runs in case of distress.¹²⁰ On the other hand, the regulation also aims at attracting crypto activities and, therefore, offers stablecoin issuers the possibility of investing their reserves in liquid assets, similar to money market funds.¹²¹ This allows a certain degree of qualitative asset transformation, increasing liquidity risks and worsening the run prospects should liquidity dry up. Therefore, the path for stablecoins to climb the ladder of the financial system in the EU is built in law and relates to the strong, rigid, and procyclical entitlements provided to token holders.¹²²

¹¹² Hui Deng, Robin Hui Huang and Qingran Wu, 'The Regulation of Initial Coin Offerings in China: Problems, Prognoses and Prospects' (2018) 19 European Business Organization Law Review 465.

¹¹³ Handagama Sandali, 'Emerging Markets Lead Global Crypto Adoption in Bear Market, Chainalysis Says' (Coin Desk, 14 September 2022) <<https://go.chainalysis.com/geography-of-crypto-2022-report.html>> accessed 17 April 2023.

¹¹⁴ Moss, Mitchell, 'Chinese Court Upholds Legality of Bitcoin Ownership, BTC Protected by China's Property Laws' (Cryptoslate, 7 November 2019) <<https://cryptoslate.com/chinese-court-upholds-legal-bitcoin-ownership-btc-protected-china-property-law/>> accessed 17 April 2023.

¹¹⁵ For a more detailed comparison between the EU and UK law on stablecoins, see Edoardo D Martino, 'Cryptocurrencies and Stablecoin Regulation: A Framework for a Functional Comparative Analysis', *Research Handbook in Comparative Financial Regulation* (Edward Elgar Publishing Forthcoming).

¹¹⁶ Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-asset [2023] OJ L 150/40. Hereinafter MiCA.

¹¹⁷ This policymaking strategy is commonly known as the "Brussel effect". Anu Bradford, 'The Brussels Effect' (2012) 107 Nw. UL Rev. 1.

¹¹⁸ On the EU approach to the regulation of stablecoins in relation to regulatory priorities, see Martino (n 83) 38–43.

¹¹⁹ Article 39 MiCA.

¹²⁰ The legislation itself defines Asset-Referenced Tokens – stablecoins – as "means a type of crypto-asset that is not an electronic money token and that purports to maintain a stable value by referencing another value or right or a combination thereof, including one or more official currencies". Article 3 (5) MiCA.

¹²¹ Article 38 MiCA.

¹²² See *supra*, text to note 56.

In contrast, the UK has taken a more pragmatic approach. In its final approval stages, the Financial Service and Market Bill (FSMB) does not construct a new regulatory framework for stablecoins and crypto assets in general. Rather, it refers to existing legislation for creating a level playing field between crypto and traditional finance. This legislative choice is in line with the explicit goal of making the UK a global hub for crypto finance.¹²³ In this framework, stablecoins are designated as Digital Settlement Assets (DSA),¹²⁴ extending to them the regulation of payment systems.¹²⁵ This regulatory architecture seems to beg stablecoins to compete. However, such competition is not even on equal footing. First and foremost, other payment services are account-based money, whereas stablecoins are circulating money. Moreover, the FSMB reserves the HM Treasury virtually limitless regulatory power.¹²⁶ Therefore, the regulation of payment services is merely a starting point from which the HM Treasury can tailor an *ad hoc* regulatory regime, expanding or restricting the scope of application of the regulation, amending obligations on stablecoin issuers, and so forth. While this regulatory power can go both ways, the very benevolent take of the UK policymaker toward stablecoins seems clear. Therefore, contrarily to the new EU regime, under the pragmatic UK approach, stablecoins can climb the ladder of the financial system via the complacency of the State that is focusing on regulatory competition to attract crypto activities while, consciously or unconsciously, overlooking the threat that this may generate to monetary sovereignty.¹²⁷

6.2. Fragmenting the market by regulation

Having wider digital currencies areas (DCA) than socially optimum is the second fundamental threat posed by circulating private digital money. This would imply that asymmetric shock would easily propagate throughout the DCA, and the States would have no control over it.

Digital currency areas were defined as networks where payments and transactions are made digitally by using a currency specific to that network. While the network itself is built in technology and may have some degree of tamper resistance against State intervention, the operations of such networks are defined by the law. In this dynamic situation, the law of different jurisdictions should be harmonized so that the network can inter-operate. In good times, more coordination can appear as a move toward efficiency, as the network gets bigger, and more transactions are possible. However, in bad times, this can generate sizeable losses as asymmetric shock propagate throughout the network. Therefore, this section argues that seemingly inefficient legal dis-coordination between relevant jurisdictions can be beneficial as it has the potential to break the DCA. Dis-coordination can be direct or indirect.

The simplest and more direct channel to fragment DCAs is to

¹²³ In this regard, Andrew Griffith, the Economic Secretary to the Treasury, stated: “The substance here is to treat [crypto] like other forms of financial assets and not to prefer them, but also to bring them within the scope of regulation for the first time”. See Rob Lenihan, ‘Crypto Price Check: Market Sees Relief Rally’ (*The Street*, 27 October 2022) <<https://www.thestreet.com/investing/crypto-price-check-market-sees-relief-rally>> accessed 17 April 2022.

¹²⁴ See Article 22(2) FSMB, defining Digital Settlement Assets as a “digital representation of value or rights, whether or not cryptographically secured, that— (a) can be used for the settlement of payment obligations, (b) can be transferred, stored or traded electronically, and (c) uses technology supporting the recording or storage of data (which may include distributed ledger technology).

¹²⁵ Article 21(b) FSMB.

¹²⁶ Article 22(3) FSMB.

¹²⁷ For an introduction to comparative cryptocurrency regulation, see Edoardo D Martino, ‘Cryptocurrencies and Stablecoin Regulation: A Framework for a Functional Comparative Analysis’, *Research Handbook in Comparative Financial Regulation* (Edward Elgar Publishing Forthcoming).

willingly limit network interoperability.¹²⁸ However, as previously discussed, this may prove difficult, especially if CBDC is adopted.¹²⁹

However, there are several indirect channels for regulatory-driven fragmentation of DCAs that *de facto* tighten network interoperability. One topical example is the divergent approaches of the EU and UK in regulating stablecoins are a possible example of such regulatory partitioning. While both approaches were criticised before because of their design, the fact that they are radically different potentially limits the expansions of DCAs.

Such dis-coordination goes beyond different legal views but is grounded on political divergences. In this case, the EU and the UK have radically different views on financial market regulation after Brexit.¹³⁰ Notably, these starkly different views on key policy objectives contrast the trajectory that brought the Euro Area Countries to create a new currency area adopting the Euro. Such a path, however imperfect, is built on the progressive harmonisation of key regulatory principles in a regime of enhanced cooperation.¹³¹

Financial market regulation is neither the only nor the main element of political disagreement in areas related to monetary sovereignty and digital networks. Another likely source of regulatory-driven fragmentation of DCAs is data and privacy regulation.¹³² Furthermore, the national security concerns raised especially by the US policymaker vis-à-vis foreign platforms, chiefly Chinese ones, provide another example of a possible indirect limit on the excessive expansion of DCAs.¹³³

Assessing the social optimality of these policies is beyond the scope of this contribution, especially when it comes to the overall welfare impact of politically sensitive divergences, such as national security issues. In this piece, the analysis is limited to the effect on digital money and the regulatory-driven fragmentation it brings about. It is important to highlight that such regulatory dis-coordination does not necessarily imply some specific reforms to be undertaken by any specific jurisdiction but may arise spontaneously from the divergence of regulatory cultures. Private forces may see the benefit of coordination to expand their operation and increase their revenues and may push for regulatory harmonization. At that point, one argument for regulators to push back from the request of global standards should be that some level of dis-

¹²⁸ On the importance of interoperability to scale up digital payment network, Mihai Christodorescu and others, ‘Universal Payment Channels: An Interoperability Platform for Digital Currencies’ [2021] arXiv preprint arXiv: 2109.12194. On the politically-driven considerations around interoperability, see Lanfang Fei, ‘Regulation under Administrative Guidance: The Case of China’s Forcing Interoperability on Digital Platforms’ (2023) 48 *Computer Law & Security Review* 105786.

¹²⁹ Text to note 80. In a more general setting, on the benefits and risks associated with interoperability in digital environments, see John Palfrey and Urs Gasser, *Interop: The Promise and Perils of Highly Interconnected Systems* (Basic Books 2012).

¹³⁰ On the approach of the UK government to crypto regulation, see Lyllah Ledesma, ‘UK Crypto-Focused Parliament Group Calls on New PM Sunak to Clarify Crypto Policies’ (*Coin Desk*, 25 October 2022) <<<https://www.coin-desk.com/policy/2022/10/25/uk-crypto-focused-parliament-group-calls-on-new-pm-sunak-to-clarify-crypto-policies/>>> accessed 17 April 2023. The level of regulatory coordination between the EU and the UK in the financial sector will largely depend on equivalence decisions made by EU and UK authorities. For a first analysis of these aspects, see Christy Ann Petit and Thorsten Beck, ‘Recent Trends in UK Financial Sector Regulation and Possible Implications for the EU, Including Its Approach to Equivalence’ (European Parliament 2023).

¹³¹ Nina Schönfelder and Helmut Wagner, ‘Institutional Convergence in Europe’ (2019) 13 *Economics*.

¹³² Hartmut Aden, ‘Interoperability between EU Policing and Migration Databases: Risks for Privacy’ (2020) 26 *European Public Law*. The relevance of divergences in data and privacy regulation for DCA was first noted by Brunnermeier, James and Landau (n 64) 20.

¹³³ See, for instance, Sec 603 of the proposal for a “Responsible Financial Innovation Act” pending in the US Senate (so-called Lummis-Gillibrand proposal).

coordination limits the threat of digital money to monetary sovereignty.¹³⁴

The optimality assessment is also problematic in determining the optimal scope of DCA. For example, regulatory-driven fragmentations may result in DCA that are too narrow or still too wide. However, this is less concerning. In the end, the exact determination of the optimum currency area is more an art than a science, both in the physical and the digital world. In fact, the actual determination of currency areas depends upon a myriad of variables, most of which are politically connoted. Hence, Mundell's criteria are better understood as guiding principles both for physical and digital currency areas.

Regulatory-driven fragmentations would achieve results that are functionally comparable to the geographical regulation in banking that persisted until the last 80 s both in Europe and the US. Once again, this functional similarity with a historical example can provide a valuable lesson. While tight regional regulation guaranteed a fair degree of systemic stability for a very long time, limiting the propagation of shocks generated by ring-fenced, small, regional banking. However, the same period also witnessed the growth of new, more speculative financial instruments, such as money market funds and asset-backed securities, to arbitrage such a stringent regulation. This should be a reminder that finance is an ever-evolving system, and the way in which it is regulated endogenously determines the subsequent technical advancement.¹³⁵

7. Conclusion

The article analysed the changing relationship between private and public money prompted by the rise of digital and cryptographic technologies. The argument builds on the legal theory of finance proposed by Professor Pistor and on the vast macroeconomic literature on money and banking.

Based on these contributions, the article develops an original framework to understand and analyse the specific threats of circulating private money in the digital age, highlighting the similarities and differences with previous historical examples.

The article identifies three main sources of threat posed by digital money to monetary sovereignty. First, the direct financial stability threat generated by having digital money and – specifically – by stablecoins. Second, the indirect threat posed by potentially aggressive competitive responses by the State. Specifically, the article analysed the potential stability threats attached to the issuance of Central Bank

Digital Currencies, especially if supported by an aggressive design meant to compete with circulating private money. Third, the risk of excessive propagation of asymmetric shocks due to the excess scope of digital currency areas. In fact, circulating private money is designed to be borderless and networks supporting that money have all incentives to scale up and seize additional gains, whereas – in bad times – shocks originating in a specific geographical or digital area are spread through the network externalizing losses.

However, even if digital money is forged in a tamper-resistance technology but they are still minted in law. Accordingly, the article demonstrates that the challenges and perils brought about by circulating private digital money is better handled through law. Specifically, the proposal is to tightly regulate the convertibility of digital currencies into state money and to limit the excessive expansion of digital currency areas through dis-coordinated regulatory regimes applicable to digital money.

The final remark of this article goes to its timing. At this stage of technology, monetary sovereignty is not under direct threat, distributed ledger technologies and stabilization mechanisms are still in their infancy and are unable to credibly guarantee liquidity and safety. However, this article showed the clear incentives of private parties to adopt circulating private money and it is likely that the next technological stage will allow them to do so reliably. From this perspective, this article is meant to be countercyclical, spotting risks and vulnerabilities early on to avoid risks piling up at a later stage. Taking late actions often proves impossible or ineffective because of market dynamics. Centuries of financial crises show that risks should be addressed early on, before they get to the apex of the financial system.¹³⁶ It is up to the academic community to flag possible future challenges and to the regulators worldwide to prove themselves up to such challenges.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

¹³⁴ On the dynamics of convergence and divergence in financial regulation and the role of lobbying, see Edoardo D Martino, Hossein Nabilou and Alessio M Paces, 'Comparative Financial Regulation: The Analytical Framework' in Edoardo Martino, Hossein Nabilou and Alessio M Paces (eds), *Research Handbook in Comparative Financial Regulation* (Edward Elgar Publishing Forthcoming) 14.

¹³⁵ Dan Awrey, 'Toward a Supply-Side Theory of Financial Innovation' (2013) 41 *Journal of Comparative Economics* 401, 413.

¹³⁶ Carmen M Reinhart and Kenneth S Rogoff, *This Time Is Different: Eight Centuries of Financial Folly* (Princeton University Press 2009).