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MONETARY POLICY IMPLICATIONS OF STABLECOINS AND CBDCS

ABSTRACT

We briefly overview the cryptocurrencies panorama in the light of recent technological innovations and discuss contemporary innovation in digital monies in the theoretical framework of the "metallist" vs "cartelist" debate on the origin of money. We discuss the issue of the trade-off between elasticity of money supply and confidence in the stability of stablecoins building on the literature on private currencies of the past. We then ask whether stable coins can become public money and focus on the monetary policy implications of stablecoins and Central Bank Digital Currency (CBDC) and conclude that digital currencies, despite their many advantages, share some of the disadvantages of both commodity money and fiat currency. Stablecoins, if properly regulated, could become a widespread means of payment: while this would help lower transaction costs, it could significantly reduce the ability of central banks to control the money supply, and thus the effectiveness of monetary policy. The issuance of CBDCs may have non-negligible economic costs (in particular, disintermediation of commercial banks) and political risks (privacy concerns). We conclude that CBDCs should be good enough to marginalise private digital currencies, but not good enough to fully disintermediate the deposits of the commercial banks.

Keywords: Monetary Policy; Stablecoins; Digital Money; CBDC
JEL Classification: E40; E42; E51; E58

RIASSUNTO

Implicazioni di politica monetaria circa le stablecoin e le CBDC

Ripercorriamo brevemente il panorama delle criptovalute alla luce delle recenti innovazioni tecnologiche e discutiamo l'innovazione delle monete digitali nel quadro teorico del dibattito "metallista" vs "cartellista" sull'origine del denaro. Discutiamo la questione del trade-off tra

elasticità dell'offerta di moneta e fiducia nella stabilità degli stablecoins, basandoci sulla letteratura sulle valute private del passato. Ci chiediamo poi se le monete stabili possano diventare moneta pubblica e ci concentriamo sulle implicazioni di politica monetaria degli stablecoins e delle Central Bank Digital Currencies (CBDCs), concludendo che le valute digitali, nonostante i loro numerosi vantaggi, condividono alcuni degli svantaggi sia della commodity money che della fiat currency. Le monete stabili, se adeguatamente regolamentate, potrebbero diventare un mezzo di pagamento diffuso: se da un lato ciò contribuirebbe ad abbassare i costi delle transazioni, dall'altro potrebbe ridurre significativamente la capacità delle banche centrali di controllare l'offerta di moneta, e quindi l'efficacia della politica monetaria. L'emissione di CBDC potrebbe avere costi economici non trascurabili (in particolare, la disintermediazione delle banche commerciali) e rischi politici (problemi di privacy). Concludiamo che le CBDC dovrebbero essere abbastanza buone da marginalizzare le valute digitali private, ma non abbastanza da disintermediare completamente i depositi delle banche commerciali.

1. Introduction

In recent years there have been significant advances in the technologies applied to payment systems (e.g. communications, encryption, data storage ...) that enabled significant innovation.

Thus, private monies ("cryptocurrencies") that create new units of currency and allow secure peer-to-peer transactions using cryptography and decentralised systems have emerged. In particular, some varieties of cryptocurrencies, in particular stablecoins, are engineered in order to maintain fairly stable prices and aspire to become widely used as a means of payment. The use of stablecoins in transactions is currently quite limited, but may experience pronounced growth in coming years, also in association with "smart contracts". Like private currencies issued in the past, stablecoins are subject to runs that can threaten the stability of the financial system, hence the need for regulation (Section 2). However, regulated or not, stablecoins may lead to significant "disintermediation" of commercial banks, alter the way that money is created and potentially undermine the ability of central banks to exercise control over the money supply. These concerns have led most central banks to examine whether their own issuance of digital currencies (Central Bank Digital Currencies, CBDCs) might allow them to avoid the drawbacks associated with the possible spread of stablecoins without forgoing the advantages offered by these new payment technologies (Section 3). However, even the issuance of CBDCs is not

without potential costs and risks and it is thus necessary to consider the nature of these costs and risks and discuss how they can be avoided or mitigated.

2. RECENT MONETARY INNOVATIONS: A QUICK OVERVIEW

In the last 50 years technological development has had a significant impact on payment system in two ways. First, previously paper records and ledgers have become electronic, and, second, the evolution of technologies has allowed the introduction of new forms of payment, such as mobile money. Despite this, the structure of the payment system has remained centralised and pyramid-shaped. At the top are the central banks and at the base the commercial banks that act as intermediaries for transactions.

In recent times various technological innovations that allow a decentralised structure of the digital ledgers and the use of cryptography have been introduced into the payment system. A classification can be made of these, such as that reported in Table 1, indicating whether each innovation implies a new, different, payment system and whether it gives rise to a new currency.

TABLE 1 - *A Classification of Digital Monies*

Categories	New payment system	New currency
Wrappers	No	No
Mobile money	Yes	No
Credits and local currencies	No	Yes
Digital currencies	Yes	Yes

Source: Ali (2014).

It should be noted that the very issuing of a digital currency does not necessarily imply the creation of a new payment system.

The first category of innovations shown in Table 1 consists of Wrappers: these are services aimed at improving the user interface and accessibility of existing payment systems. Examples of

Wrappers are Google Wallet, Apple Pay and Paym, which exploit existing "infrastructure" to link users' mobile phones to their bank accounts[1].

Mobile Monies entail the use of currency issued by national states but represent new payment systems: they consist of schemes that allow the storage of monetary credit on a smart card or other system-providers "books" such as Alipay.

Credits and local currencies are schemes in which private companies accept money in payment for a "credit" to an "account" which can be "spent" on a particular platform, such as within online games. These tools generally use existing payment systems.

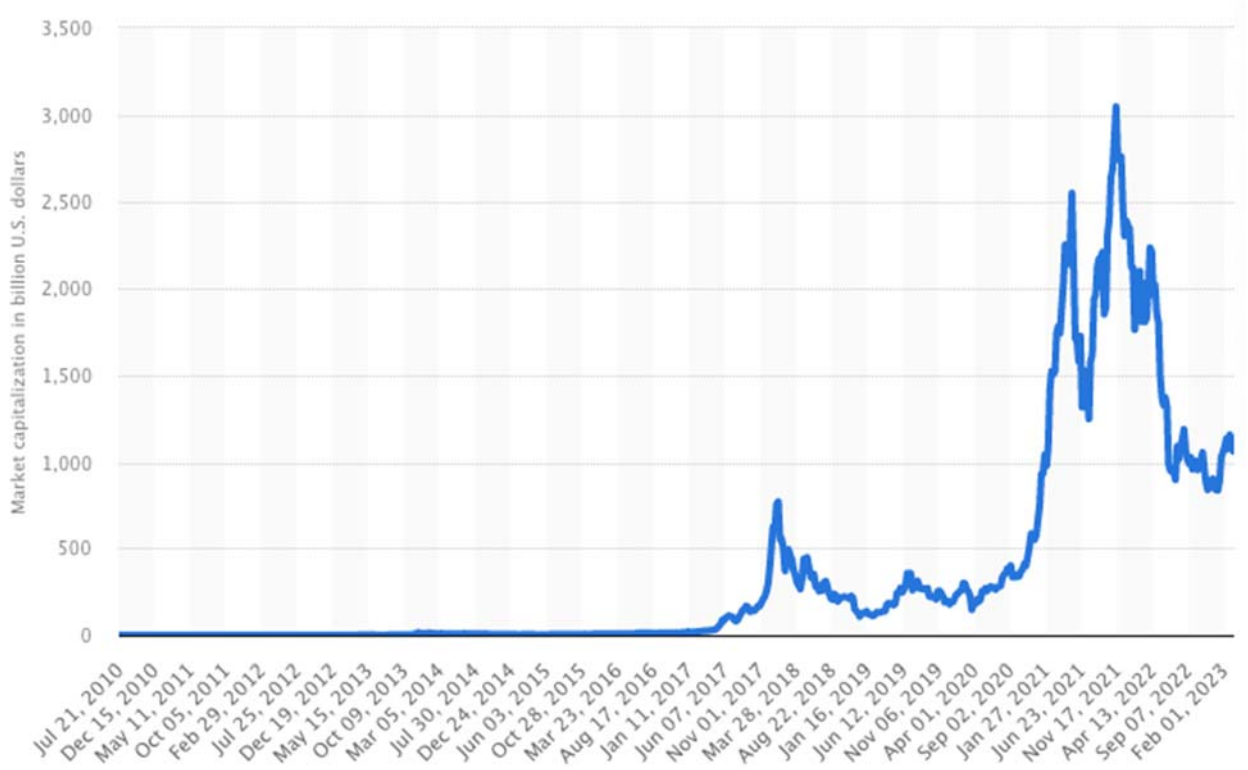
At present, the most significant monetary innovation is digital currency. This is a currency that is available exclusively in electronic form. What differentiates digital currency from electronic currency is that the former never takes physical form. Digital currency never leaves a computer network and is exclusively exchanged by digital means.

The key innovations of this type of currency are two: a) the use of distributed ledgers that allow decentralised peer-to-peer exchanges of "credit" without the need for intermediaries and, even, in the absence of trust between agents; b) the use of cryptography to access the credit, thus eliminating the need for intermediaries.

Cryptocurrencies, which are a particular variety of digital currency have grown impressively both in volume and value since Bitcoin was launched in 2009. The market for cryptocurrencies grew to almost 3 trillion US dollars in 2021 before falling to around 1 trillion US dollars in early 2023 (Figure 1).

[1] Wrappers are not without risk. Indeed, they face risks associated with liquidity (sudden run on requests for redemption) and could be subject to default. See Adrian and Mancini-Griffoli (2019).

FIGURE 1 - *Market Capitalization of Cryptocurrencies*



Source: Statista (2023).

At present, the varieties of cryptocurrencies which deserve particular attention are the unbacked cryptocurrencies, stablecoin and the central bank digital currencies (CBDCs). Both unbacked cyptocurrencies and stablecoins are private currencies, while CBDCs are digital currencies denominated in the national currency and issued by central banks[2]. Roughly 90 percent of the world's central banks are currently investigating central bank digital currency (CBDC) projects[3]. By the end of 2022, 11central banks (between them the People's Bank of China) had issued a CBDC for widespread retail or wholesale use. Some, including those in the United States and South Africa, are still at the exploratory phase while others are developing projects (the European Central Bank)[4].

2 See among others Auer *et al.* (2021).
3 See, Atlantic Council CBDC Tracker (2023).
4 The differences between the main existing projects are illustrated, among others, by Mastromatteo and Rossi (2023) in this issue.

The unbacked currencies, such as Bitcoin and Ether, were originally designed to be used as a medium of exchange and, since they have no intrinsic value, they are therefore often called "fiat cryptocurrencies". However, given their price volatility, they are currently mostly used for speculation rather than for payment purposes[5]. As Bindseil *et al.* (2022) aptly write:

"As Bitcoin does not generate value for society apart from hopes for speculative gains, these private costs will represent a net loss for society when music stops".

Unlike unbacked cryptocurrencies, stablecoins aspire to becoming a means of payment in the strict sense of the word and set a 1:1 exchange ratio with a national currency, usually the US dollar. To ensure the stability of this ratio, stablecoins are backed by reserves in assets that are liquid or can easily be made so.

There are four categories of backed stablecoins:

1. Fiat-backed, against which issuers hold 1:1 reserves of a fiat currency;
2. Crypto-backed, which are backed by cryptocurrencies via smart contracts and are "over-collateralised", because the value of the cryptocurrencies backing exceeds the value of stablecoins issued;
3. Commodity-backed, against which issuers hold equivalent value in commodities;
4. A further category of stablecoins is the algorithmic ones, which are unbacked but issuers aim to maintain a stable value by managing the expansion and contraction of token supply.

Although stablecoins have achieved maximum media exposure when Facebook announced its intention of launching a backed currency named Lybra (in June 2019) and more recently Diem, stablecoins have in fact existed for much longer, the first being launched in 2014. Currently, the two most important stablecoins are Tether and USD Coin, which have a market capitalisation of about 65 billion US dollars and 45 billion US dollars, respectively. There are two main reasons for the impressive growth in the number and value of stablecoins. The first lies in the fact that stablecoins are used on a wide cross-section of cryptocurrencies exchanges. The second lies in the high per dollar brokerage costs when trading cryptocurrencies and using traditional means of payment. This makes it convenient to use stablecoins in these transactions.

[5] See Ardizzi *et al.* (2023) in this issue.

In the still short span of their existence, backed stablecoins have shown low volatility in their price, especially when compared to unbacked cryptocurrencies. This low volatility is undoubtedly attributable to the high degree of liquidity of the assets with which they are backed by. The stability of price of algorithmic stablecoins, on the other hand, appears problematic.

The recent crash of the UST stablecoin (linked to the Terra ecosystem) and the associated cryptocurrency LUNA is probably the most striking example of the possible vulnerability of crypto currencies environments[6]. The facts are still to be fully understood but Vitalik Buterin one of Ethereum's founders has criticised the use of algorithmic stablecoins such as UST claiming that the premises themselves were "intentionally misleading and inherently flawed". Owners of UST and LUNA cryptocurrency seem likely to open legal litigation with Luna Foundation Guard and Terraform Labs, the two entities behind the platform issuing the crypto assets, which reside legally in Singapore. Aggressive and, possibly, criminal action by speculators sent the value of the coin to zero and inflicted severe losses on participants in the market.

However, even in the case of backed stablecoins the reserve assets may differ significantly from one currency to another. Moreover, there is not always transparency and oversight on the ability of the issuers to repay the invested capital at par and on demand. Because of this, some questions are justified. Are there solid guarantees about the stability of the price of stablecoins over time? Is it possible for these cryptocurrencies to coexist as a means of payment with sovereign currency and banking deposits? What are the foreseeable effects of the spread of these cryptocurrencies on banking intermediation?

3. Old and new monetary innovations

As we know, the main explanations of the origin of money can be traced back to two main strands: the "metallist" hypothesis and the "cartelist" hypothesis[7].

The metallist hypothesis dates back to a seminal study by Menger (1892) according to which the currency emerges impersonally from the interaction of individuals optimising the exchange of goods[8]. The good that emerges as a medium of exchange is the most saleable good, which is

[6] See Ardizzi *et al.* (2023) and Abate *et al.* (2023).
[7] See Goodhart (1998).
[8] See Kiyotaki and Write (1989).

identified on the basis of its intrinsic characteristics (e.g. transportability, stable chemical-physical characteristics over time etc.) through a process of spontaneous selection.

As Giannini writes (2011; p. 27):

"Despite his undoubted merits ... Menger's analysis has obvious limitations in that it says little about all the conscious attempts to move beyond commodity money and towards payment technologies with a greater fiduciary content and hence greater risk of misuse".

In fact, if we consider the historical evolution of money and payment technologies we find the emergence of increasingly abstract forms of money, ever more distant from commodity money. As is well known the use of commodity money has three disadvantages. First, the production of this type of currency involves the diversion of resources from other uses. Second, variations in the quantity of commodity money are often erratic: as an example, if the commodity currency is gold, the increase in the quantity of money depends on the level of exploitation of existing, and the discovery of new, gold mines. Given the link between money and prices, variations in the quantity of the commodity of which the currency is made leads to fluctuations in the price level with obvious economic and social costs. The third and most significant disadvantage of commodity money is, however, represented by its low supply elasticity with respect to production; the quantity of money is substantially exogenous to the dynamics of the economy. In a context where prices were perfectly flexible, this would have no significance. Indeed, price changes would establish the currency in real terms corresponding to that demanded. However, in reality the prices of a large part of goods, services and wages are not perfectly flexible, on the contrary they demonstrate a significant degree of rigidity. Therefore, an increase in the level of production can be hindered by the fact that the quantity of commodity money is fixed or has a very low elasticity. This elasticity depends exclusively on the fact that when the commodity currency is scarce its price should increase and this should induce the producers to increase its production. However, given the rigidity of prices, even when this currency is scarce, its price may increase only to a limited extent. This implies that the evolution of the payment system has to a large extent depended on the demand for a higher elasticity of money supply. In this context various artifices have been introduced such as "cutting" metallic money, reducing the precious metal content in alloys, the adoption of double monetary systems: one for internal transactions, the other for international.

This need for elasticity is met by the introduction of innovative monetary instruments characterized by a higher elasticity of supply with respect to the trend in production activity. The introduction of abstract currency forms, with a face value different from their intrinsic value, such as convertible currency and fiat currency has, on the one hand solved the most serious disadvantages of commodity money, i.e. the inelasticity of the supply, but on the other hand has raised the issue of establishing and maintaining trust in the stability of the future value of money, a problem absent from the case of commodity money given the perfect correspondence between its face and intrinsic value. The stability of the value of fiat money is assured by the State and this currency played a crucial role in the two-layer monetary system that came into being, in most advanced countries, in the second half of the 19th century and then spread everywhere. It represents the anchor of this type of system[9].

Some scholars[10] have likened the monetary innovations that are currently emerging in the payments system to those that, in the past, gave rise to the introduction of the banknote, the assignment of the issuing monopoly to the national central bank[11] and then, in the second half of the 19th century, to bank money.

In reality, there are profound differences between these monetary innovation processes. The introduction of banknotes and bank money were prompted by the need for instruments that would increase the money supply in line with developments in productive activity. Current monetary innovations, on the contrary, do not contribute to increasing the elasticity of the money supply: indeed, under certain circumstances, as will be seen below, they may even decrease it[12]. They do, however, exploit advanced technologies to reduce transaction costs and in this way should facilitate trade.

4. Are stablecoins free from the risks of old private currencies?

The evolution of the payment system has been characterized as a trade-off between elasticity of supply and confidence in the stability of its value. Such a trade-off becomes increasingly

[9] See Brunnermeier and Landau (2022).
[10] See in particular Vandeweier (2021).
[11] See Gorton and Zhang (2022) for an illustration of the process that led in major countries to the central banks' monopoly of minting money.
[12] In the case of Bitcoin and other un-backed crypto currencies the totally exogenous nature of the "money" is seen as an intrinsic virtue.

pronounced as the currency becomes uncoupled from any commodity. Two hypotheses have been put forward about the problem of creating and preserving trust in abstract money: i) the competitive production of money and ii) the role of the State as guarantor of the property rights of the holders and producers of money.

In the hypothesis of the competitive production of money, money is seen as being akin to a good. In this context the attribution of the responsibility for creation of money to the State (or to an institution delegated by it such as the central bank) ends up in the destabilization of its value. In this interpretation it is assumed that policymakers have the sole objective of conserving, and where possible extending, their power in a short term perspective. In democratic regimes, in particular, they resort to over-issuing money and, hence, inflation to gain consensus. Central bankers, seeking to maintain their roles, tend to support the policy defined by the policymakers.

This inflationary bias would be eliminated should central banks' monopoly of producing money be removed. In a seminal article Klein (1974) showed that in a regime of competitive production of money the risk of over-emission would be excluded. In fact, each currency would be associated with a "brand" that would signal its quality. Consumers would be encouraged to use the highest quality coins, i.e. those characterised by a high stability of their value over time. In a competitive regime the risks of monetary over-issuance would be avoided both by the control on the quality of the different brands by consumers and by the producers' need to safeguard their brand. Similar considerations are found in Hayek (1978): competition would force private issuers of irredeemable currencies to maintain those currencies' purchasing power.

Several objections can be raised to the hypothesis of the competitive production of money[13]. First, this approach assumes that consumers are able to recognize the quality of a currency and to evaluate the behaviour of its issuer. Secondly, the assumption that the issuer of a private currency is more concerned about maintaining a high brand value for its currency than the State is questionable. In fact, a private individual unquestionably has a shorter time horizon than the State, it follows that private actors have a higher discount factor on any quality losses of their currency than the State would have.

[13] See Goodhart (1998) and Giannini (2011).

The objections just expressed regarding the competitive production of money lead us to believe that the State has a crucial role in preserving confidence in the stability of the value of a means of payment.

As highlighted by Friedman (1960), at a general level in the context of competitive money production, monetary equilibrium does not necessarily lead to stable prices. According to Friedman, in fact, in a competitive context, money issuers, like the producers of any other asset, would tend to maximise profit, or to equal cost and marginal revenue. Given that the marginal cost of virtual currency is close to zero – in the absence of constraints set by the algorithm itself – the equilibrium production of this currency would be the one which corresponds to a value of marginal revenue (given by the inverse of the general price level) equal to zero. This implies that the general price level would be infinite.

This also occurs when, as in the case of current virtual currencies, the production costs of these are not zero. In this case, as highlighted by Férnandez-Villaverde and Sanches (2019), there would be a continuum of equilibrium trajectories in which the value, in real terms, of private currencies would tend to zero even in a context in which issuers tend to maximise profit and are concerned about the future value of the money they issue[14]. This conclusion suggests that self-feeding inflationary episodes may occur both in a context of competitive money production and, as shown by Obstfeld and Rogoff (1983) and by Lagos and Wright (2005), when money is produced and managed by the State. These are situations similar to banking panics. In the case of digital currencies there is no central decision maker that acts in strategic terms but rather, the competitive dimension is fed by the possibility of creating new currencies based on new algorithms and on the possibility for a group of users to create a new "branch" in the tree of an existing currency governed through a blockchain determining new rules ("forking").

The above aspects lead to the question of how trust in monetary instruments issued competitively can be preserved. Studies on the competitive systems of money production are based almost exclusively on the search theoretic models (see Kiyotaki and Wright, 1989; 1993), in particular on the most recent formulations such as the Lagos and Wright (2005) model. In these models the degree of acceptability of the money is exogenously given. However, a currency can only be accepted if it is "recognizable", i.e. if its quality can be confirmed. Jevons writes appropriately (1875/1876; p. 40):

[14] See also Férnandez-Villaverde (2021).

"As an intermediary of exchange, money must continually pass from one hand to another, and it would be a very serious disturbance if all those receiving a coin were to examine it diligently, and try it at wise. If a special skill was needed to know the currency, poor and ignorant people would always be deceived. The intermediary of the exchange must therefore have certain distinct signs on which nobody can be deceived".

In a context of information asymmetries, therefore, the quality of money or coins can only be ascertained by sustaining costs. If these costs were borne by individual consumers, the use of the currency could become excessively burdensome and be discouraged thus penalising trade.
The attribution of the responsibility for ensuring the "recognizability" of the currency allows, on the one hand, to lower the "costs of production" of trust and, on the other, to overcome the problems of free riding that can compromise the cooperation between producers. In a monetary system governed in a public, centralized way the costs of countering the falsification (anti-forgery technologies, administrative and police controls etc.) are charged to the community; in the case of stablecoins this activity is guaranteed in a de-centralised way by private subjects who respond to private incentives. This means that this type of digital currency, like all private currencies, is exposed to the risk of runs[15].

A first reason for this stems from the fact that issuers of stablecoins, in pursuit of profit maximisation, invest their resources in a variety of assets. Therefore, when a holder of stablecoins demands the return of their investment or part of it, the issuer has to dispose of a portion of the assets held in reserve. Different types of reserve assets entail different risks for the holders of stablecoins. A first case is when the issuer holds short-term assets such as short-term government bonds. It may happen that, in a sudden spike in redemption requests, investors become concerned that the issuer may not be able to meet future requests in full and a run may ensue due to the investors' attempts to redeem their investment before it is too late[16]. This is similar to the situation that affected US money market funds in 2008 after the collapse of Lehman Brothers[17]. On that occasion, the run on these financial institutions contributed, in no small measure, to the rise in money market interest rates and the fall in the market values of short term debt instruments[18]. In order to cauterise these effects on the money and banking

[15] As noted by Garzón Espinosa *et al.* (2023) in this issue, this hinders their use as a means of payment.
[16] In this case, the government would be forced to intervene to avoid negative repercussions on the stability of the financial system. See Van der Weide and Zhang (2021).
[17] See Gorton and Zhang (2021) and Dark *et al.* (2022).
[18] See Liao and Caramichael (2022).

markets, the US Treasury Department in late September 2008 announced a temporary guarantee programme for money market funds. In March 2020, at the onset of the Covid19 crisis, given the risk that the Money Market Funds would not be able to meet redemption requests at full value, the Federal Reserve established the Money Market Mutual Fund Liquidity facility[19]. Nevertheless in early 2023 the case of the Silicon Valley Bank suggest that bank run are real possibility and that a public intervention is necessary in order to prevent systemic bank crises.

Stablecoins backed by the national domestic currency are, of course, free from this type of risk. In this case, however, to perform strictly as pegs, stablecoins should not be on loan. Otherwise, part of the lending tends to result in new deposits, multiplying the stock of crypto-denominated assets relative to the reserves held. In this way, a run that exceeds stablecoins' backing may occur[20].

Another risk of runs on stablecoins can arise from the, very real, possibility that stablecoins are backed in a variety of ways and that there are opacities about how they are backed. Even in the case of Tether, the largest stablecoin in circulation, the backing is not entirely transparent. They are described by the issuer of this cryptocurrency as follows:

"Tether tokens are referred to as stablecoins because they offer price stability as they are pegged to a fiat currency. This offers traders, merchants and funds a low volatility solution when exiting positions in the market.
All Tether tokens are pegged at 1-to-1 with a matching fiat currency (e.g., 1 USD₮ = 1 USD) and are backed 100% by Tether's reserves"[21].

The ability of issuers of stablecoins to exercise discretionary reserve composition makes these types of cryptocurrencies similar to the private coins issued in the UK and US in the 19th century. These coins, given the information asymmetries between issuers and holders of them, were often subject to over issuance. Emblematic is the case of the US "wildcat" banks[22], which, in order to hinder restitution claims, were located in particularly inaccessible places and issued

[19] See Gorton and Zhang (2021).
[20] See Lyons and Viswanath-Natraj (2023).
[21] See https://tether.to/en/how-it-works/.
[22] See Gorton and Zhang (2021).

significantly more notes than the reserves they held[23]. It has been observed that the similarity between stablecoins and the private monies issued in 19th century by the free banking systems is not particularly apt, since in such systems, unlike stablecoins, currencies were traded at different values, depending on the trustworthiness of the private institution issuing them[24]. This observation, although useful to highlight the differences between 19th century private currencies and stablecoins, does not undermine the argument that both types of currencies, given the existence of informational asymmetries, are not, as Jevons would say, "recognizable" and thus lend themselves to the possibility of fraud on the part of the issuer. In situations where the value of money is not "recognizable", the so-called "No Questions Asked"[25] property of money is lost[26]. The resulting "confusion of coins" inevitably favours, as happened in the case of the private currencies of the past mentioned above, the emergence of bank runs and financial instability. In the 19th century, the response to this risk was the creation of monetary systems based only on government-backed banknotes and of central banks with a monopoly on issuing banknotes. Issuers of stablecoins seem to be aware of this problem. Indeed, some of them have resorted to rating agencies to certify the strength and liquidity of their reserves[27].

5. How can digital currencies become public money?

For the foregoing if digital currencies are to be used as currency, it is necessary for states to regulate their production.

There are two main solutions to achieve this. The first is to create the conditions for stablecoins to become public money. The second is to introduce a Central Bank Digital Currency (CBDC) and thereby marginalise stablecoins.

[23] See Rolnick and Weber (1982).
[24] See Selgin (2021).
[25] See Giannini (2011).
[26] See Holmstrom (2015).
[27] In addition to the risk of runs, stablecoins are exposed to other risks. These risks stem from individuals' errors and security flaws. A large part of these risks stem from the fact that transactions in the cryptocurrencies space are final and cannot be reversed. For instance, if an individual transfers coins to the wrong account, or "wallet", he cannot get them back. Similarly, if an individual loses his username/password, his coins are lost. Given the immutability factor, if a haker breaks into a laptop and steals the coins, the holder permanently loses his coins. Cash money is currently used in illegal trade and criminal activities. Of course, criminals' favour for cash comes from the anonymity it provides. However, in the case of cash anonymity comes at a price of a twofold nature: i) cash exposes to the risk of theft; ii) cash (in large quantities) is physically cumbersome. Both limits of cash as a tool for guarantying anonymity do apply to cryptocurrencies.

5.1 How can Stablecoins Become Public Money?

It must be ruled out that the use of stablecoins can imply a transition from a regime of monopolistic money production to one of competitive money production, as advocated by free bankers. Such a transition cannot result in an efficient monetary equilibrium[28]. As noted by Férnandez-Villaverde (2021; p. 522-523):

"In general, a monetary equilibrium with private monies will not deliver price stability. When a profit-maximising entrepreneur issues money, that agent will try to maximise the real value of seigniorage". And "... A purely private monetary system does not provide the socially optimum quantity of money even in the equilibrium".

Furthermore, it seems clear that states will not be willing to lose control over the quantity of money and monetary policy.

Therefore, stablecoins can become public currency in two different ways:

1. By ensuring that stablecoins are issued by FDIC-insured banks or are backed by deposits of such institutions. In this case, stablecoins would either stand alongside other means of payment already operated by banks, such as Paypa, Venmo and Alipay, or, backed by deposits of commercial banks, would be guaranteed by a mix of loans, assets and central bank assets held by these institutions, in any case FDIC-insured.
2. By ensuring that stablecoins are backed 100% with reserves held at the central bank[29]. In this way, stablecoins would be equated with narrow banking. Not surprisingly, this hypothesis has reopened the debate on narrow banks and their implications for the banking system and the economy as a whole. The creation of this type of institution could lead to disintermediation. Such disintermediation could manifest itself with particular intensity in periods of financial stress or panic, adversely affecting the money creation process[30].

In fact, as evidenced by an extensive recent literature[31], bank money can be created at anytime if the government or private sector are willing to accept a debt and if the banks (backed by the central bank) are willing to extend the credit. In fact, the process of creating bank money comes

[28] See Friedman and Schwartz (1986).
[29] This is a possibility contained in the proposed Stable Act of 2020.
[30] See Liao and Caramichael (2022).
[31] See McLeay *et al.* (2014), Jakab and Kumhof (2015) and Werner (2014; 2016).

from the growth of loans. Therefore, loans create deposits and not vice versa. It follows that changes in the monetary multiplier are endogenous since they depend on the behaviour of private individuals. Monetary authorities influence private agents through the setting of the policy interest rate and the supervisory authorities through the regulation of banking activity. Thus, there is a close connection between credit creation and money creation.

No wonder, then, that even in recent times the Federal Reserve has been concerned that narrow banks could disrupt financial intermediation and have a negative effect on financial stability[32].
The coexistence of stablecoins, i.e. private money, and bank money would affect not only the financial structure of the economy, but also the transmission of monetary policy. Indeed, in this case, the effectiveness of monetary impulses would depend to a large extent on two factors: the degree of disintermediation of banks following the introduction of stablecoins and the type of remuneration of stablecoins[33]. If agents hold stablecoins in deposit-like accounts, banks' deposits could decrease, making these institutions more dependent on wholesale funding. This could increase the effectiveness of monetary impulses since wholesale deposits are more responsive than retail deposits to changes in policy interest rates. The remuneration of stablecoins depends mainly on the composition of their reserve assets. If the latter were made up exclusively of domestic currency, the return on stablecoins should be similar to that on bank deposits (perhaps minus some fees). In this case, the transmission of monetary impulses should be neither strengthened nor weakened. Conversely, if there are multiple currencies in the reserves' basket the yield on stablecoins would be more marginally affected by changes in monetary impulses and, therefore, the effectiveness of monetary policy would be weakened[34]. This situation would mainly affect economies whose currencies are not stable and where the reserve assets of stablecoins consist of currencies other than the domestic one. In these economies, the effectiveness of monetary policy transmission would be significantly weakened. In countries with low fiscal capacity, the spread of stablecoins would then undermine the use of monetary policy to provide resources to the government through seigniorage. In these countries, the existence of private currencies might constitute a limit on government recourse to inflation tax. This could happen when confidence in the stability of the value of the private currency is

[32] Fed (2019).
[33] See G7 Working Group on Stablecoins (2019).
[34] See Savona (2023) in this issue.

greater than the confidence in the value of the State currency[35]. In this case the demand for the latter would decrease following a process of replacing public money with private currencies. A recent example of this is offered by Venezuela, where, given the extraordinary loss of value in the bolivar and the impossibility of holding dollars citizens have, on many occasions, adopted crypto currencies.

5.2 The Issuance of a CBDC

There is widespread concern that the rise of private digital currencies could threaten the monetary sovereignty of central banks and governments[36], in fact stablecoins, when regulated, taking advantage of their large customer base, could assume a dominant position in the payments system. The loss of monetary sovereignty by central banks would compromise both the effectiveness of monetary policy and its ability to operate as a lender of last resort with serious consequences for the stability of the financial system. These concerns as we have seen have led central banks around the world to consider whether to issue their own retail digital currency.

It is widely believed that the introduction of such a digital currency would drastically reduce households and businesses costs of payment and give the central bank full control over the quantity of money. At the same time, the issuance of CBDCs would make private digital currencies less attractive, thereby restricting their spread and reducing the potential associated problems. The issuance of CBDCs would also relax the zero lower bound constraint on the policy interest rate[37].

In fact, if CBDCs were remunerated and cash eliminated[38] or made unprofitable[39], the interest rate on them would represent the floor of the policy interest rates – in this case, if the introduction of CBDC were coupled with the elimination of cash[40].

[35] See Broadbent (2016).
[36] See Brunnermeier *et al.* (2019).
[37] It has been observed that these effects could be counteracted with various lines of defence. See Panetta *et al.* (2022) and Adalid *et al.* (2022).
[38] See Rogoff (2016).
[39] By imposing taxes on it (Gesell, 1916 and Goodfriend, 2000) or by fixing an unfavourable exchange rate with respect to deposits on it (Goodfriend, 2016 and Buiter, 2009).
[40] Also desirable for other reasons, such as to combat tax evasion, and illegal activities. Of course, counter-arguments include the call for privacy protection. An open issue is whether digital technologies will make it possible to reconcile anonymity with traceability. Indeed, today banks both monitor their customers' accounts for evidence of money

As seen in the recent past, when policy interest rates are close to zero, central banks room for maneuver in the conduct of monetary policy is very narrow. Indeed, traditional technology does not permit (either positive or negative) interest to be paid on cash: this implies that negative rates are possible on central bank reserves but transmission of such extremely loose monetary policy to the economy is limited by the ability of bank deposit holders to switch from deposits to cash. In fact, since the carrying costs of cash (costs of storage, safekeeping ...) are small but positive the effective lower bound is not zero but somewhat less. Of course, should all cash be replaced by CBDC, the effect of negative interest rates could be fully deployed into the system.

That would allow commercial banks to set negative interest rates on deposits and central banks to recover margins of freedom in the conduct of monetary policy in a context where the natural interest rate is particularly low[41].
However, the fact that the introduction of a CBDC also has possible costs partially counters these advantages[42].

One of the main concerns of policymakers is that CBDC may favour cyclical bank runs[43]. If households and firms can hold CBDC, it is possible that a sudden loss of confidence in banks could lead to a flight-to-safety from commercial banks deposits to CBDC, undermining the stability of the banking system[44]. In fact, if the replacement rate between CBDC and bank deposits were high, there could be sudden and extensive portfolio adjustments. Should these adjustments lead to high liquidity drainage from the banks, tensions and insolvencies in the banking system could emerge.

A second type of risk is that in the restrictive phases, the process of replacing bank deposits with CBDC accounts could be intense, making the credit channel particularly vulnerable. Restrictive manoeuvres would be particularly pronounced in those sectors that are most dependent on bank credit and in those systems in which companies are heavily dependent on this form of financing. In order to limit these negative effects on the transmission of monetary policy resulting from the introduction of CBDCs, the use of various corrective instruments have been suggested. For

laundering and other illegal behaviour and shelter them from prying eyes: also in the future something like that must occur (Eichengreen, 2019).
[41] See Haldane (2015) and Camera (2017).
[42] See Bini Smaghi (2023) in this issue.
[43] See Coeuré (2018).
[44] Such a process occurred in France in the 1930s when it was possible for private individuals to hold deposits at the central bank. See Beaubeau *et al.* (2018).

example, it has been proposed to set ceilings on individual CBDC holdings[45], to introduce a tiered remuneration of CBDC so as to discourage a massive substitution of bank deposits with these assets[46], or for central banks to fund commercial banks in order to replace their lost deposits[47].

A further risk is that the introduction of CBDC could trigger competition between central banks and commercial banks in the deposit market, the outcomes of which could be various[48]. The initiation of competition between central banks and commercial banks would mean the overthrow of the two-layer monetary system established almost everywhere between the 19th and 20th century and characterised by commercial banks lending and receiving deposits and central banks abstaining from doing so, but rather controlling the money supply and regulating the conditions prevailing in the money market. The issuance of CBDM could severely undermine the mechanism of creating money based on commercial banks; as it is well know, such a mechanism currently guaranties the high elasticity of the money supply. As already mentioned, commercial banks inject money into the system by providing loans to government, households and firms. If the bank loans received from private individuals were used in the purchase of CBDC, this multiplier process would be interrupted and the elasticity of the money supply would inevitably fall.

In addition to possible costs of economic nature, the issuance of a CBDC also entails risks of political nature.

First, there can be a loss of privacy associated with the issuance of a CBDC and its management by the central bank. This would allow the bank, and hence potentially the government, to monitor all its citizens transactions with evident risks to the viability of a democracy.

Second, the central bank issuing a CBDC, under pressure from the government, might be tempted to water down the rules of market adopted by private lenders, giving rise to forms of political interference in allocating credit[49]. This could happen if commercial banks, if

[45] See ECB (2020).
[46] See Bindseil and Panetta (2020).
[47] This point refers to the debate on the optimal size of central banks' balance sheets. See Claeys and Demertzis (2107).
[48] See Stevens (2017).
[49] See Cecchetti and Schoenholtz (2021).

disintermediated by the issuance of a CBDC, were forced to seek extensive refinancing from the central bank[50].

The possible economic costs and political risks suggest that caution is required as to whether and, if so, how a CBDC should be issued[51].

6. Conclusions

We are experiencing a period marked by the introduction of significant innovation in the payment systems associated with the application of advanced information technologies to these systems. Among these innovations, the creation of digital or virtual currencies plays a very important role, especially in terms of longer term perspective. Some economists have seen in this process the possibility that the monopolistic production of money that currently is at the base of the financial system could be replaced by forms of competitive, decentralised production of money. This paper shows that digital currencies, despite their many advantages, share some of the disadvantages of both commodity money and fiat currency. Like fiat money, digital currencies have no intrinsic value, however, among them the backed stablecoins, especially those backed 1:1 by domestic currency, exhibit substantial price stability. These stablecoins, if properly regulated, could become a widespread means of payment. While this would help lower transaction costs, it could significantly reduce the ability of central banks to control the money supply, and thus the effectiveness of monetary policy. Hence, there is a widespread belief that central banks should address this problem by issuing their own digital currencies.

However, the issuance of CBDCs may have non-negligible economic costs and political risks.

On the economic level, the issuance of CBDCs could cause a pronounced disintermediation of the banking system, lead to a form of competition between central banks and commercial banks, and effectively break up the two-layer monetary system established in advanced countries in the second half of the 19th century. In this system, commercial banks and central banks exercise different, non-competing functions: the former lend and receive deposits while the latter, abstaining from this function, control the quantity of money and regulate the conditions prevailing in the money market. At the political level, the issuance of CBDCs and their

[50] See Niepelt (2021).
[51] See Waller (2021).

management by the central bank could be associated with a loss of privacy of transactions and the possibility of the government monitoring the private lives of its citizens.
These possible costs and risks lead one to carefully consider what characteristics CBDC should have and how it could be managed.

In the final analysis, it would be a matter of creating a CBDC which is "good, but not good enough". In short, the digital currency issued by the central banks should be good enough to marginalise private digital currencies, but not good enough to disintermediate the deposits of the commercial banks. To this end, one could propose that the central bank issue a digital currency, but manage it in a hybrid manner. In particular, retail accounts in CBDC could be managed and operated by commercial banks and the account balances reported to the central bank periodically. In such a management scheme, the commercial banks would not be disintermediated and the central bank would retain control over the money supply without becoming a retail bank. At the same time, it would mitigate the political risk associated with the loss of transaction privacy that would occur if the CBDC were managed directly by the central bank. Entrusting such management to the commercial banks would make the anonymity of a digital currency compatible with the requirements of the anti-money laundering and "know your customer" rules.

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