

Stablecoins: A Brave New World?

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March 2020, WP 757

ABSTRACT

At the root of the notion of stablecoin (SC) lies a desire to reconcile two different worlds: that of legal currency, whose essential attributes are hierarchical order, the vocation to uniqueness and stability of the purchasing power, and that of crypto-assets, featuring decentralization, multiplicity and thus the possibility of choice, and the instability of value. Do SCs fulfill their promises? With regard to their volatile prices, limited number, small total amount, and concentrated market, SCs have so far met with a mixed success. They rather represent a complement to the crypto-assets market. However, the arrival of very large issuers, securing a higher degree of confidence to users, and apt to reach a wide public, could give their projects a potentially systemic impact. These global SCs would create risks, in particular for financial stability and monetary policy, and in lesser-developed economies. This paper reviews these risks and the way the private sector, regulators and central banks can address them.

Keywords: Stablecoins, monetary policy, financial stability

JEL classification: E42, E52, E58

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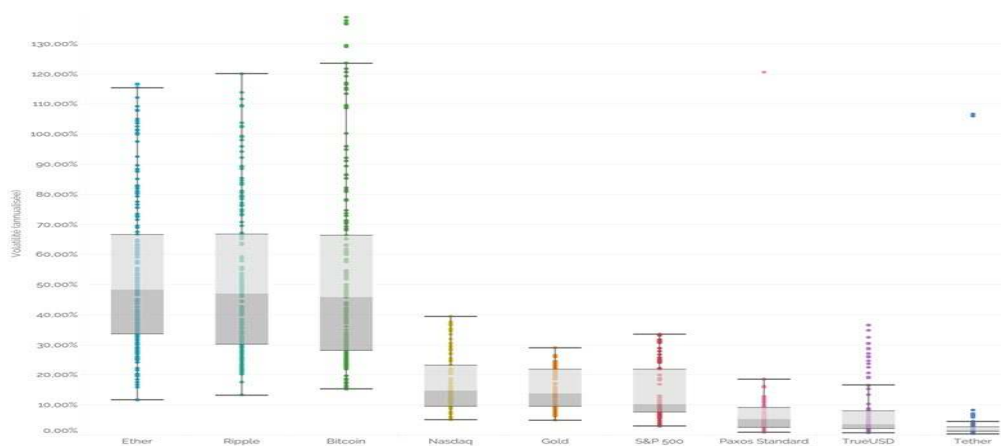
The views expressed are those of the authors and do not commit the Banque de France, the Eurosystem, Kaiko, Paris 1 Panthéon-Sorbonne or Sciences Po. We thank Adeline Bachellerie, Jean Barthélémy, Françoise Drumetz, Jean-Michel Godefroy, Lionel Potier, Mariana Rojas-Breu and Nicolas de Sèze for their remarks and remain responsible for any errors.

NON-TECHNICAL SUMMARY

At the root of the notion of stablecoin (SC) lies the desire to reconcile two worlds: that of legal tender, whose essential attributes are hierarchical order, the vocation to uniqueness and stability of the purchasing power, and that of crypto-assets (CAs), featuring decentralisation, multiplicity and therefore the possibility of choice, and the instability of value (Pfister, 2017). But can SCs manage to marry fire and water? Are they really stable and can they be stable without giving up decentralization? Can they make a significant place for themselves alongside the traditional players, central banks and payment service providers, or even marginalise these players? Should the public authorities seek to supervise them, and if so are they likely to do achieve that goal? Should they be oppose their own innovations to SCs? This paper attempts to answer these questions by first assessing the contributions of SCs, then the macroeconomic risks they generate, and finally the responses that these risks call for.

SCs can be defined as crypto-assets (CAs) that aim to maintain a stable price in vis-à-vis a benchmark. The latter is most often provided by a legal currency, sometimes by a basket of currencies, a commodity such as gold, or even another CA. By using SCs, CA investors are thus able to remain in the "crypto universe", with its advantages in terms of resilience, integration, immutability and anonymity (Pfister, 2017), while benefiting from a stable environment, generally borrowed from the legal reference currencies. SCs seem to offer a brave new world. In fact, given some volatility in their prices (see Figure), their small number, limited outstanding and the concentration of their market, the success of SCs seems to be very mixed, and their market has so far appeared as an appendix to that of the CAs.

Comparative volatility of stablecoins and other assets



The paper focuses on two categories of risks which are specific to global stablecoins (GSCs): the risks for financial stability, and those for monetary policy. For both categories of risk, a distinction is made between wholesale and retail SCs. Regarding financial stability, a wholesale SC could lead to the concentration of financial transactions in a blockchain, which would strengthen the connections between large financial institutions and large firms at the global level, creating a single point of failure and a too big to fail moral hazard issue. The viability of the business model of retail SCs depends largely on the level of interest rates on the assets held. However, the historically low levels of interest rates nowadays considerably limits the return on the reserve. In order to preserve its profitability, the issuer may thus be tempted to invest in securities that are riskier, in terms of credit, liquidity, and

duration or even exchange rates. Regarding monetary policy, in the case of wholesale SCs, their issuance could lead to a decrease in demand for reserves in the reference currency. On the other hand, if the wholesale SC is backed in whole or in large part by base money, the demand for reserves could increase significantly and become more volatile. The use of retail SCs, especially if it were to be widespread, possibly leading to the crowding out of legal tender, would raise difficulties for the conduct of monetary policy, both in terms of the transmission mechanism and implementation. These difficulties would be similar to those raised by dollarisation.

The private sector could respond to the risks posed by GCSs by improving the quality, efficiency and rapidity of transfers, especially at the international level. It could be helped by the interconnection of central banks' real-time gross settlement (RTGS) systems. Regulators can first coordinate in order to avoid regulatory arbitrage. However, since regulations differ according to the nature of the assets concerned (e.g. money or securities), regulators must also consider the legal classification of the SCs. Central banks can respond at two levels: the level at which they usually operate, *i.e.* the national level or, for monetary unions, the area level, but also at the international level. At the national/area level, they can adopt prudential policies measures, with for example the strengthening of liquidity requirements, to cope with potentially more frequent runs. They can also adapt monetary policy, with a possibly important role for the exchange rate and choose to issue CBDCs to counter SCs. At the international level, central banks can also coordinate and possibly issue a global digital currency, although the latter initiative would raise issues regarding timeliness, governance and implementation.

Stablecoins : Le meilleur des mondes ?

RÉSUMÉ

Au fondement de la notion de stablecoin (SC) se trouve la volonté de concilier deux mondes : celui de la monnaie légale, dont les attributs essentiels sont l'ordre hiérarchique, la vocation à l'unicité et la stabilité du pouvoir d'achat, et celui des crypto-actifs, caractérisés par la décentralisation, le foisonnement donc la possibilité de choix, et l'instabilité de leur valeur. Les SC y parviennent-ils ? Au regard de la volatilité de leur cours, de leur faible nombre, de leur encours limité et de la concentration de leur marché, les SC n'ont jusqu'à présent rencontré qu'un succès très mitigé et font figure d'appendice du marché des crypto-actifs. Toutefois, l'arrivée de très grands acteurs assurant l'émission de SC et susceptibles de toucher un large public pourrait procurer un niveau de confiance supplémentaire aux utilisateurs de SC et donner à leurs projets une portée potentiellement systémique. Ces SC mondiaux créeraient des risques, en particulier pour la stabilité financière et la politique monétaire et dans les économies les moins développées. L'article passe en revue ces risques et les réponses que le secteur privé, les régulateurs et les banques centrales peuvent leur apporter.

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At the root of the notion of stablecoin (SC) lies the desire to reconcile two worlds: that of legal tender, whose essential attributes are hierarchical order, the vocation to uniqueness and stability of the purchasing power, and that of crypto-assets (CAs), featuring decentralisation, multiplicity and therefore the possibility of choice, and the instability of value (Pfister, 2017). But can SCs manage to marry fire and water? Are they really stable and can they be stable without giving up decentralization? Can they make a significant place for themselves alongside the traditional players, central banks and payment service providers, or even marginalise these players? Should the public authorities seek to supervise them, and if so are they likely to do achieve that goal? Should they oppose their own innovations to SCs? The paper attempts to answer these questions by first assessing the contributions of SCs, then the macroeconomic risks they generate, and finally the responses that these risks call for.

1. Contributions

The definition and variations of SCs are recalled in order to assess the extent to which their contributions meet the expectations they raise.

1.1 Definition and variations

SCs can be defined as CAs that aim to maintain a stable price in vis-à-vis a benchmark. The latter is most often provided by a legal currency, sometimes by a basket of currencies, a commodity such as gold, or even another CA. Except in the latter case, where SCs can be likened to derivatives on CAs, the aim pursued by the promoters of SCs is to remedy one of the two congenital defects of CAs, the volatility of their price expressed in legal tender. The other flaw is related to scalability, *i.e.* the limited capacity to process a large volume of transactions (Dark *et al.*, 2019). By using SCs, CA investors are thus able to remain in the "crypto universe", with its advantages in terms of resilience, integration, immutability and anonymity (Pfister, 2017), while benefiting from a stable environment, generally borrowed from the legal reference currencies. SCs seem to offer a brave new world. From this perspective, SCs, if they fulfill their promise of stability, would be the next natural step in the evolution of digital assets (Coeuré 2019).

SCs can be declined in four complementary ways:

- According to the price guarantee mechanism: this is the most commonly used classification. The guarantee of convergence towards their benchmark offered by the SCs is ensured through both a governance system that imposes rules to stabilise the value of the SC and the entities (or technologies) responsible for managing the stability mechanism (G7, 2019). Berentsen and Schär (2019) thus distinguish between algorithmic SCs, off-chain guaranteed SCs and on-chain guaranteed SCs. In the former, an algorithm is supposed to stabilize the price of the SC by selling or buying units depending on whether the price against the benchmark is expected to be higher or lower than the target value (usually parity in the case of legal tender), in the manner of a central bank intervening in the foreign exchange market. As with foreign exchange intervention, the problem is of course that, while it is always possible to create units, purchasing capacities are limited by accumulated reserves. However, these reserves, resulting from the issuer's collection of fees on the purchase of units, the transactions financed by them, their custody and redemption, are very limited, which generally prevents the issuer from redeeming enough units in the event of a

significant fall in prices. Berentsen and Schär (2019) therefore warn against their use. Off-chain SCs guaranteed are the most numerous and widespread SCs. Guarantees (*e.g.* bank deposits) are held there with third parties. In this, they do not conform to the original CA model as illustrated by Bitcoin. In addition, these guarantees should cover at least 100% of the units issued and be subject to frequent verification by external audits, which is costly. Berentsen and Schär (2019) therefore identify a profitability problem for off-chain SCs: these schemes are unlikely to cover their costs in a low interest rate environment where the guarantees provided by the holders yield little. Finally, in on-chain guaranteed SCs, the guarantees are housed on the blockchain accepting the SC. Since only CAs are accepted on a blockchain, on-chain SCs must use CAs as collateral. For example, users of the DAI SC are asked to bring Ether. Given the high volatility of CAs' prices, on-chain SCs are therefore "over-guaranteed" (guarantees must cover more than 100% of the units issued, *e.g.* at least 150% in the case of DAI) and their users are subject to margin calls, failing which their position is liquidated, creating a negative externality. A slightly different classification is adopted by Bullmann *et al* (2019). The latter distinguish "tokenised" funds among off-chain guaranteed SCs on the grounds that these funds, which commit to a redemption at par, follow the business model of electronic money issuers. However, SC issuers are not currently subject to the same regulatory obligations as electronic money issuers: their commitment to redeem at par is only contractual and their ability to honour it needs to be periodically validated by audits, as indicated above;

- Depending on whether the SC is potentially systemic or not: this approach, which is particularly relevant when assessing risks to macroeconomic stability (see section 2), is the one adopted by the G7 working group on SCs (G7, 2019). According to this distinction, while all SCs pose risks, initiatives built on a large customer base and/or cross-border have the potential to scale up quickly, achieving a substantial global footprint. These initiatives refer to Global Stable Coins (GSCs) and call for specific responses, whether from major private financial and payment services players, regulators or central banks (see section 3);
- Depending on the target market, wholesale (large-value transactions, typically between financial institutions or between financial institutions and large corporations) or retail (mass transactions between individuals or between individuals and merchants). This distinction echoes the distinction that can be made between the two forms of central bank digital currency (CBDC), with wholesale CBDC aimed at financial institutions and retail CBDC aimed at the public (Pfister, 2017, 2019, 2020). Furthermore, compared to the immediately preceding declaration, any wholesale SC is potentially systemic;
- Depending on the reference, which may be unique (most often the US dollar) or constituted by a basket as envisaged by the promoters of the Libra initiative (Libra, 2019).

1.2 Assessment of contributions

Although SCs were introduced in 2014, just over 200 projects had been announced by July 2019, and only 66 of them had actually been implemented by then, with a total capitalization of \$4.3

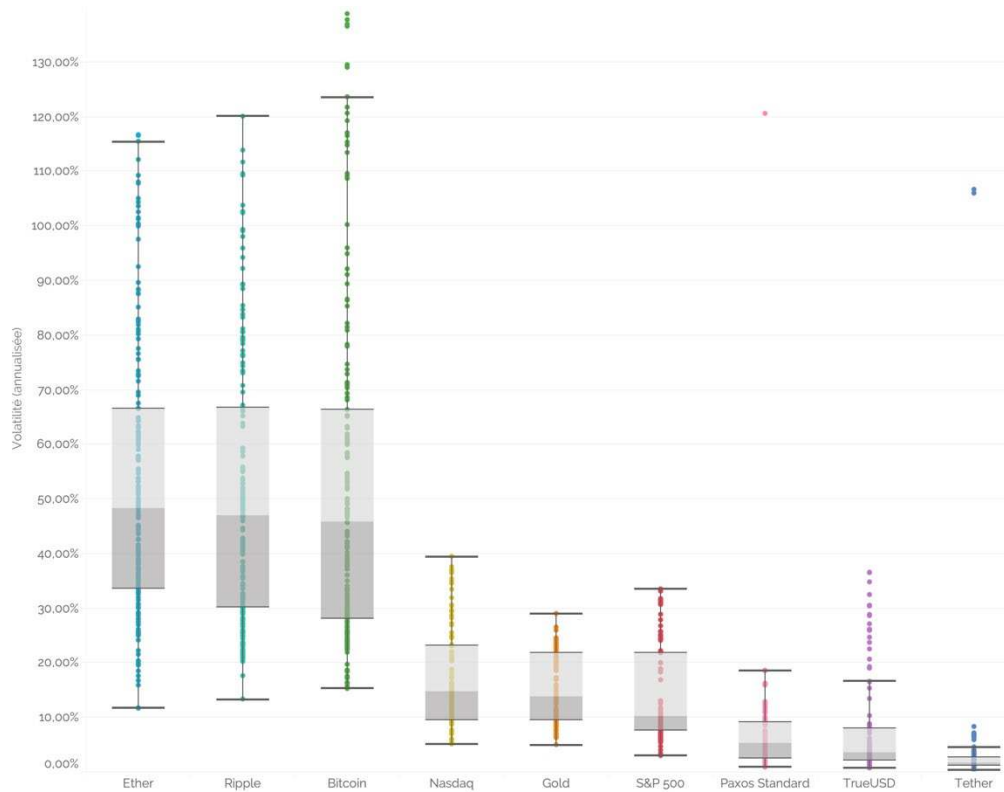
billion. However, their market is highly concentrated, with Tether representing, in July 2019, 95% of transactions and 81% of capitalisation (Bullman *et al.*, 2019).³

Chart 1 compares the price volatility of various SCs (Tether, True USD and Paxos Standard) with that of other CAs (Bitcoin, Ether, and Ripple) as well as with that of the NASDAQ and S&P 500 indices and gold, over the period from June 10, 2019 to December 9, 2019 (all prices are expressed in dollars).⁴ The volatility of the SCs is not zero, contrary to what a literal interpretation of the term "stable" might suggest. However, the median volatility (represented by the separation of the "box" of each of the volatility distributions into two shaded portions) of equities or gold, and especially that of the other CAs, is outside the range of the volatility of the SCs, which highlights the relative stability of the SCs. More specifically, Tether has a median volatility of 2%, TrueUSD of 4% and Paxos Standard of 5%, compared with around 50% for Bitcoin, Ether and Ripple, and between 10% and 15% for the NASDAQ, gold and the S&P 500. Chart 1 also shows that the volatility distribution of SCs is characterised by positive skewness, *i.e.* a high probability, albeit much lower than that of other CAs, of large price variations.

³ Tether issues two SCs, one referenced on the dollar (USDT) since October 2014, the other on the euro (EURT) since the beginning of 2017. However, the volume of the second is negligible. In this article, the term Tether is therefore used to refer to the USDT.

⁴ The comparison with a pair of reserve currencies (e.g. euro/dollar) is not made because reserve currencies do not have an exchange rate target, whereas the selected SCs target parity with the dollar.

Chart 1: Comparative volatility of stablecoins and other assets



Sources: Kaiko, Saint-Louis FED. Authors' calculations

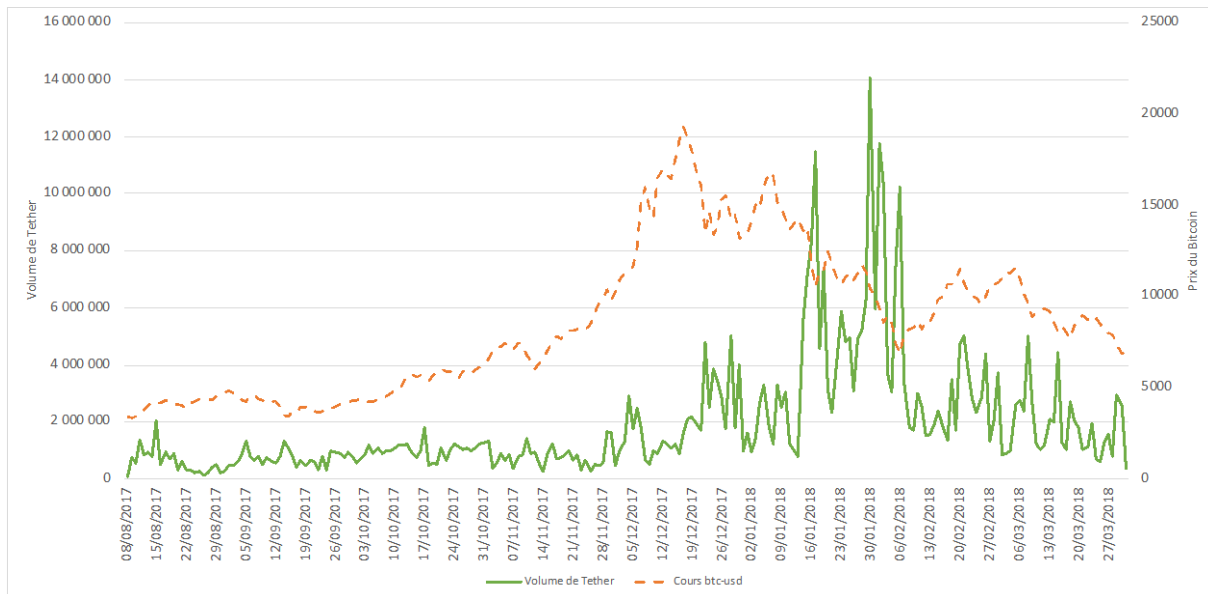
The data recovered covers the period from 10 June 2019 to 9 December 2019. The volatility shown is the 7-day rolling annualized standard deviation of the daily returns of each of the assets.

Moreover, if the GSC reference is defined as a basket, as initially announced for Libra (Libra, 2019), then the stability of the GSC rate against the holder's currency cannot by construction be assured. However, as the result of an average effect, the price volatility of a basket-backed SC can be expected to be lower than that of non-basket-backed SCs (except in the case where the exchange rate regime between the reference currency and the holder's currency is fixed). This property makes basket-backed SCs a *priori* good candidates for the denomination and settlement of international transactions.

SCs also enable arbitrage between CAs while maintaining a link to the investor's reference currency and avoiding regulatory constraints and costs (transaction fees, frequent lack of liquidity, high price volatility, etc.) related to conversions between CAs and legal currencies. They are thus intended to act as a vehicle within the world of CAs. In addition, by remaining in the CA universe, investors can continue to benefit from the use of pseudonyms under which all CA transactions are carried out and avoid declaring any capital gains that would otherwise be taxable.

In line with the role of SCs as a vehicle within the CA universe, Chart 2 suggests that CSs may have been used to secure capital gains made on other CAs, such as Bitcoin.

Chart 2: Volume of Tether in circulation and price of Bitcoin



Source: Kaiko. Authors' calculations

At the end of 2017 - beginning of 2018, (graph 2) there is a correspondence between the strong fluctuations and then the collapse of the Bitcoin price and the surge in the Tether issue: between December 18, 2017 and February 12, 2018, the exits from the Bitcoin market (42.7% fall in price) corresponded to subscriptions of Tether (213% increase in Tether volume). However, although this is not their stated purpose, SCs could also be used as an instrument of speculation. Indeed, it is likely that Tether fed the Bitcoin bubble. Griffin and Shams (2019) test two hypotheses that can account for changes in the price of Bitcoin and the volume of Tether over the period late 2017 - early 2018. According to the first hypothesis, consistent with the above observation, Tether's demand would explain the increase in its volume; according to the second one, Tether's increase in volume would result from an artificial increase in supply. The results of the study, based on the observation of on-chain data from Tether and Bitcoin, validate the second hypothesis. In fact, in 2017, the issuer of Tether, who also owns the Bitfinex trading platform, was suspected of having exploited the inflation in the price of Bitcoin to replenish its dollar reserves, because it did not previously hold the dollar equivalent of reserves necessary to guarantee all of the Tether issued. The increase in the volume of Tether in circulation would thus have reflected price manipulation and not, as would be expected in the normal operation of a SC, increased investor demand.

Given some volatility in their prices, their small number, limited outstanding and the concentration of their market, the success of SCs seems to be very mixed, and their market has so far appeared as an appendix to that of the CAs.

However, the arrival of very large players issuing off-chain guaranteed SCs with the potential to reach a wide audience could provide an additional level of confidence to SC users and give their projects a potentially systemic reach:

- Among the wholesale SC projects, two of the largest stand out: the USC project and the JPM Coin. USC (Utility Settlement Coin) is an initiative led by major banks.⁵ It aims to create a market infrastructure for cross-border payments, which are nowadays often costly, lengthy and opaque, which would satisfy the recommendations of the various regulators. Circulating on a "permissioned" blockchain (Pfister, 2017), this SC would be issued in different references and would be entirely backed by reserves held with the central banks issuing these references (the Canadian dollar, the euro, the pound sterling, the Japanese yen and the US dollar), making it possible in principle to guarantee convertibility at par in these legal currencies. The primary contribution of this project would be to offer users the possibility of making almost instantaneous settlements at the global level every day of the year, at any time of the day, allowing liquidity savings by holding only one pool of liquidity at the global level in each of the currencies represented, instead of several pools with different correspondent banks depending on time zone constraints. The JPMorgan project is similar in the technology employed ("permissioned" blockchain) and in the purpose (real-time money transfer at the institutional level, 365/24). It has two important differences with that of USC: in the current state of the project, the only reference currency would be the US dollar and, above all, the guarantees would be constituted by deposits with JPMorgan bank, and not by central bank reserves, leaving liquidity and credit risks. The JPM Coin aims to reduce friction on the dollar money market by facilitating the settlement of transactions between different customers. Another case where the JPM Coin could be used is in the repo market, which could be extended to intraday maturities, making it possible to release collateral by ensuring faster turnover;
- Among the retail SC projects, the most famous is Libra, which was made public on June 18, 2019, with the publication by Facebook of the White Paper on Libra (Libra, 2019), an SC whose launch was then scheduled for the second half of 2020. Libra must be issued and governed by the Libra Association, which is responsible for the validation of transactions made on a "permissioned" blockchain. Other private players were part of this association, such as Vodafone, Coinbase, Spotify, Uber, etc.⁶ In the White Paper, Libra is presented as a global currency which, as such, "must be conceived and governed as a public good". Libra would be backed by a basket including only stable currencies, which would ensure its stability, by investing the assets raised through issues of Libra units in "a set of low-volatility assets, including bank deposits and government securities in the currencies of stable and reputable central banks" (Libra, 2019). In addition, the securities would be held with custodians with a very good rating from the agencies. This process is similar to that used by central banks in managing their reserves. Libra would be accessible to Facebook account holders in countries that allow it. Facebook has also created Calibra, a member company of the Libra Association, which is developing the blockchain on which the Libra units would be issued and which would provide the native Libra portfolio. It is therefore likely

⁵ UBS, Banco Santander, Deutsche Bank AG, Bank of New York Mellon Corp, State Street Corp, Credit Suisse Group AG, Barclays PLC, HSBC Holdings Plc.

⁶ At the start of the Libra project, 28 partners had been announced. However, in October 2019, the major payment companies - Visa, Mastercard, PayPal, Stripe - decided to withdraw from the project for reasons of insufficient development but also for image reasons, Libra being at the heart of a regulatory debate. Other partners have decided to leave the initiative for the same reasons: Booking Holdings, Mercado Pago, eBay and Vodafone.

that Calibra will be very widely adopted by Libra holders, allowing Facebook to access very high quality personal information, which could pose a privacy issue.⁷

Better than the historical CAs, SCs could thus contribute, for wholesale GSCs, to the integration of financial transactions on the blockchain, allowing to reduce frictions in cross-border payments. Similarly, retail GSCs could lower the costs of remittances and contribute to financial inclusion in emerging countries. In addition, a basket SC could reduce the dollar's dominance in international transactions and the external adjustment difficulties that this causes for emerging economies (Fatás and Weder di Mauro, 2019).⁸ Finally, in emerging or developing economies, particularly those that experience currency instability or are subject to structurally high inflation, a basket SC could provide a substitute for legal tender, in particular as a store of value. In this regard, it is certainly questionable whether economic agents in countries with unstable currency values would benefit from using a basket of currencies as a backstop for their assets rather than buying hard currency directly. However, by buying a basket, these players would reduce exchange rate risk (*i.e.* the volatility of the basket would likely be less than of a currency pair) on the one hand, and possibly make savings in terms of diversification costs on the other. The purchase of the basket could therefore be justified if it is not too different from the optimal risk/return combination for the holder.

2. Risks

The G7 report on GSCs (G7, 2019) indicates that CSGs present two types of risk:

- Those inherent in any SC initiative, often common to other CAs' schemes, whether SC or not : legal certainty, in particular with regard to the rights of users; governance, allowing for a clear assignment of responsibilities, in particular in the review and control of risks; financial integrity, in order to prevent SCs from financing illicit activities; regulatory arbitrage, whereas regulatory frameworks are intended to apply irrespective of the technology used; market integrity, as the pricing of the services provided, starting with price stabilisation, must be fair and transparent in order to protect the consumers and ensure level playing field competition; data protection, as users need to know how their data can be used by participants in the ecosystem surrounding the issuance blockchain and possibly also by third parties; consumer/investor protection, as the risks and obligations of each party need to be clearly established and set out; compliance with tax requirements, as SCs should not provide a vehicle for fraud;
- Those specific to GSCs: Not only can the risks inherent in any SC be magnified in the case of GSCs, but GSCs create three specific categories of risk. The first category relates to the conditions of competition (lack of competition would prevent consumers from benefiting fully from the innovation that CSs represent; obviating this risk would require full interoperability of CSs). The second category of risks relates to financial stability implications, the third to monetary policy implications.

⁷ Calibra could in the future play a more important role by extending its activities to other financial services (Libra, 2019).

⁸ The authors assume that the composition of the Libra basket is identical to that of the Special Drawing Rights (SDRs), even though the weight of the dollar should be higher in Libra.

The rest of this section focuses on the last two categories of GSC-specific risks, whose implications are more macroeconomic in nature than those relating to competition. In principle, these risks are only likely to materialize in economies where confidence in legal tender is not sufficiently assured, and/or the supply of financial products is limited, and/or the health of financial intermediaries is questionable, and/or payments systems are inefficient (Beau, 2020). These would therefore tend to be less developed or possibly also emerging economies. A particularly serious risk would be that of a substitution of GSCs for legal tender, which could lead GSC issuers to make them self-referential. These issuers would then become the equivalent of central banks in a universe of private currencies: this is the theme of the "loss of monetary sovereignty". For both categories of risk, a distinction is made between wholesale and retail SCs.

2.1 Risks to financial stability

2.1.1 Wholesale SC

Wholesale SCs pose several risks that could jeopardize financial stability. Those, such as JPM Coin, that are not backed by central bank deposits, present a residual credit risk. Moreover, the concentration of financial transactions in a blockchain would strengthen the connections between large financial institutions and large firms at the global level, creating a single point of failure and a *too big to fail* moral hazard issue in the case of systemic SCs.

2.1.2 Retail SC

From the issuer's perspective, the viability of the business model of retail SCs depends largely on the level of interest rates on the assets held. If the SC is 100% backed and the reserve invested in assets denominated in currencies such as the dollar, euro or yen, the historically low levels of interest rates nowadays considerably limits the return on the reserve. In order to preserve its profitability, the issuer may thus be tempted to invest in securities that are riskier, in terms of credit, liquidity, and duration or even exchange rates, even if the latter strategy would not replicate the composition of the basket. In the case of a basket SC, it could even in principle change the composition of the basket (such a provision is provided for Libra; Libra, 2019), in order possibly to appropriate capital gains on reserves but, unless it did so surreptitiously, it would thus expose itself to a risk of loss of credibility that could trigger a run.

From a holder's perspective, what would be the financial implications for users of a CS if the issuer defaults or ceases operations? Insofar as investors are aware, these risks are reflected in a discount of the units issued in relation to the benchmark, which can cause a crisis of confidence leading to a run. This is the situation that the NuBits algorithmic SC, which is supposed to offer parity with the dollar, faced in March 2018. Its price collapsed and has been stagnating below 10 cents since the beginning of 2019. In the case of on-chain guaranteed SCs, in the event of a significant decline in CA prices, the inability of investors to meet margin calls may also cause a run, although the issuer has the option of liquidating the position of defaulting investors. Finally, in the case of off-chain guaranteed SCs, two conditions have to be met for the units to be redeemable at any time: that the issuer does not occupy a position such that the liquidation of its positions would cause a collapse of the financial markets in which it has invested or a liquidity crisis in the banks with which it has made deposits (in the case of a GSC), and that it has prudently managed the reserve as indicated

above. This second condition is, however, difficult to verify if the issuer does not frequently submit itself to external audits that could affect its profitability, as indicated above. Indeed, Tether has only submitted itself to incomplete audits. On 15 September 2017, it published a single overview of an audit performed on its cash balance, as well as month-end bank statements from December 2016 to March 2017, the validity of which was verified by a Chinese accounting firm. Furthermore, loans by Tether to affiliate companies were included in the reserve in March 2019.

The transparency requirement should also be complied with, in relation to the fees received by SC issuers (entry, exit, custody, and transaction fees). For example, depending on the size of the USDT to dollar conversions, fees range from 0.4% to 3%. In this regard, the combination of fee income and no or lower remuneration than the reserves held by off-chain guaranteed CSs should in principle lead to a depreciation of the SCs vis-à-vis their benchmark, reflecting covered interest rate parity. This depreciation could in turn cause a run. In the opposite direction, the services provided by these SCs to their users could offset the costs incurred, allowing prices to remain close to parity. However, it is noteworthy that euro-linked SCs are few in number and collect only modest amounts: STASIS Euro is the most widespread euro-linked SC in 2019, with a market capitalisation of only €35 million.

2.2 Risks to monetary policy

The impact of GSCs on the conduct of monetary policy could be much greater than that of "historical" CAs (Pfister, 2017).

In the case of wholesale SCs, their issuance could lead to a decrease in demand for reserves in the reference currency. This could be the case in particular if the wholesale SC, as envisaged by JPM Coin, is not backed by central bank deposits, as envisaged for the USC. This is because the unwinding of transactions that had previously been on the books of the central bank, such as the settlement of clearing balances, could then be shifted to the wholesale SC blockchain. One consequence is that, in the event of a liquidity crisis affecting the money market, the central bank's less detailed knowledge of institutions' cash holdings could make its intervention as lender of last resort more difficult. *A fortiori*, this would be the case if the cash tensions were to concern foreign currencies, since the central bank wishing to come to the rescue of institutions under its jurisdiction would then need to hold foreign exchange reserves of sufficient amount and liquidity. On the other hand, if the wholesale SC is backed in whole or in large part by base money, the demand for reserves could increase significantly and become more volatile, depending on the liquidity needs of SC users. This could be the case, for example, for SCs backed by reserve currencies. In this regard, since wholesale SCs should be available at all times, cash pressures could affect wholesale SCs backed by central bank money outside the business hours of the issuing central bank, exposing their holders to liquidity risk. However, this issue could be addressed by moving to a real-time monetary policy.⁹ Finally, as in the case of wholesale CBDC (Pfister, 2019, 2020), the question of the remuneration

⁹ In a real-time monetary policy, the central bank retains an operational target for the level of interest rates at the shortest maturities in the money market, but the distinction between *overnight* maturities, which are explicitly traded, and *intraday maturities*, which are nowadays implicitly charged, is abolished: transactions may be carried out directly at maturities shorter than overnight (Pfister, 2018).

of the assets backing the SCs backed by central bank money, compared with the remuneration of reserves, would also arise.

With regard to retail SCs, the risks mentioned below are linked to the substitution of SCs non-referenced exclusively to the legal currency for the latter one. The use of retail SCs, especially if it were to be widespread, possibly leading to the crowding out of legal tender, would raise difficulties for the conduct of monetary policy, both in terms of the transmission mechanism and implementation:

- Transmission mechanism. This mechanism can be broken down into the interest rate channel, the credit channel and the asset price channel (Drumetz *et al.*, 2015, Chapter 5). The conversion of bank deposits into SC and the eventual distribution of SC-denominated loans would weaken the transmission to the economy of changes in the legal tender interest rate. For example, in case this rate would increase, the incentive to save and reduce the incentive to take on debt, and thus the contractionary impact in the economy, would be lessened. On the other hand, the credit channel would be ambiguously affected. The narrow channel could be weakened because the liquidity of the banking sector would be at least partly in SC and could not therefore be directly affected by the central bank unless the central bank itself intervenes in SC. Conversely, the broad channel would be reinforced by increased financial frictions if there were less substitutability between SC and legal tender financing than between different forms of legal tender financing (*e.g.* between intermediated credit and securities issuance). Finally, as long as legal tender remains used as the unit of account, the asset price channel could become more powerful as the impact of interest rates on the exchange rate would affect a larger proportion of assets. Overall, the impact on the transmission mechanism would be ambiguous and could be marked more by greater uncertainty about the effects of monetary policy, which could in turn justify greater gradualism (Brainard, 1967; Drumetz *et al.*, 2015, 219-232) than by a reduction in its power. In this regard, a parallel can be drawn with dollarisation (Baliño *et al.* 1999; Levy Yeyati 2006): work on the subject has shown that dollarisation makes the choice of an intermediate monetary target more risky, a less important issue now that monetary targeting is no longer practised (Drumetz *et al.* 2015, 127-131) but also involves uncertainty. Moreover, Levy Yeyati (2006) notes that economies affected by dollarisation have suffered higher inflation rates, regardless of the evolution of monetary aggregates, which may reflect greater difficulty in exercising monetary control;
- Implementation. As long as legal tender continues to be used and therefore there is a demand for base money, it should remain possible to implement monetary policy. Benigno *et al.* (2019) nevertheless propose a model where a digital currency would compete with non-competing national currencies, leading to perfect convergence of interest rates between them and thus depriving the central bank of the ability to adapt monetary policy to conditions specific to its economy. Furthermore, according to Benigno *et al.* (2019), national currencies would be eliminated from portfolios by a GSC that would serve a higher rate of interest net of operating costs than that served on bonds issued in national currencies, leading central banks to lower interest rates to a very low level in order to maintain the use of their currencies in transactions. However, the model is based on restrictive and unrealistic assumptions. Indeed, there is in fact competition between

national currencies (in France, for example, the currency of the contract is at the choice of the parties and the only case where payment in legal tender is compulsory is that of taxes); yet there is no developed dollarised economy or *a fortiori* a developed economy where a digital currency has displaced legal tender. Moreover, legal tender, and not just the obligations in which it is denominated, as the authors assume, serves an interest (*i.e.* legal tender is not the same as the banknote). It is therefore not surprising that, nowadays, it is the policy rates that determine the validity of the GSC economic model (see Section 1) and not, as Benigno *et al.* (2019) indicate, the GSCs that determine the policy rates. However, one has to ask what would happen if a GSC, having largely displaced legal tender in transactions and as a store of value, became self-referential, allowing its issuer to conduct its own monetary policy. Provided that legal tender remains used as the unit of account, possibly by regulatory constraint, would the central bank retain only the ability to cap the interest rate by collecting deposits, as in a world without money where currency is replaced by other financial assets (Woodford, 2001)? Moreover, what could the central bank role be in times of liquidity crisis? A parallel with dollarisation may be useful here as well. One of the consequences of full dollarisation is to limit the lender-of-last-resort function, which can only then be carried out only within the limits of the foreign exchange reserves held by the central bank (Bourguinat and Dohni, 2002). In the extreme case of a GSC crowding out legal tender, foreign exchange reserves would have to be invested in GSCs, but the amount of liquidity that the central bank could provide would be limited, whereas it is not normally limited when providing its own currency. Moreover, again as in the case of full dollarisation but also as in a world without currency, seigniorage would be eliminated, making the central bank dependent on a budgetary allocation to cover its operating costs (Woodford, 2001), unless it has sufficient capital.

However, a GSC can have benefits, in addition to lowering the costs of international transfers and contributing to financial inclusion in emerging markets (see Section 1), by increasing the choice of trading and investment instruments, sharpening currency competition by allowing the good currency to drive out the bad one (Hayek 1976), and disciplining monetary policy where appropriate. In turn, asset diversification and the disciplining effect on monetary policy resulting from currency competition encourage local investment and increase fiscal resources (Raskin *et al.*, 2019).

3. Responses

The responses of the private sector, regulators and central banks to the risks posed by SCs are discussed in turn.

3.1 Private sector responses

SCs are deployed in an environment driven by two currents: an assumed supply capacity enhanced by the underlying technology, and demand in targeted markets or with shifting consumer preferences (Frost *et al.*, 2019). This applies fully to GSCs. However, payment industry players, in particular banks, can respond to the challenge by improving the quality of the services they provide.

In this respect, one of the most radical transformations in recent years is the commoditisation of *instant* payments, which is a form of real time payments. This is particularly evident in China, where

the two giants Alipay¹⁰ and WeChatPay account for 92% of mobile payments made, in a total market of 41 trillion dollars in 2018 (Klein, 2019). These platforms offer instant payments via digital wallets and QR codes, which offer more possibilities than ApplePay's digital representations of credit cards, with the exception of the ability of digital wallets to store users' money.

In China, due in part to competition from Alipay and WeChat, banks' return on equity fell by 35 basis points in both years (2015 and 2016), reducing their return on equity by 6.7 percentage points (Dietz *et al.*, 2017). Faced with a threat of disruption targeting their business, banks in the United States, Europe and Australia have responded first by digitizing some of their operations: about 15 to 25 per cent of the annual budgets of banks in these regions have been allocated to information technology (IT) in 2016 (Citi, 2018).

In France, the major banks have joined forces to create *PayLib entre amis*, a system that allows users to identify themselves with their phone number via the bank's online platform and make instant payments with other users without needing information about them such as the IBAN code associated with their bank account.

At the European level, since 2008, TARGET 2 has been the RTGS system developed and managed by the Eurosystem, with each country managing its national component. In November 2018, to facilitate the full roll-out of instant payments in Europe, the Eurosystem launched, within TARGET2, a system for the settlement of instant payments in central bank money, the TARGET Instant Payment Settlement (TIPS) service (Pfister, 2018). This new service operates on a 24/7/365 basis and is offered at a rate of 0.20 euro cent per transaction for at least the first two years of operation, with entry and maintenance fees for a TIPS account set at zero, and the aim that the Eurosystem will eventually fully cover its costs in this respect. However, more than a year after this initiative, instant payment is still not widespread in the euro area, mainly because of its cost to users.

At the global level, in the face of inefficiencies in the correspondent banking system, central banks issuing major reserve currencies could interconnect their RTGS systems to facilitate cross-border payments. This initiative, which would partly compete with, partly complement the wholesale GSC initiatives, would extend their action at the national or currency area level. Indeed, RTGSs aim to provide a secure framework for the final settlement of wholesale transactions, notably through the use of central bank money; moreover, they are partly in competition with privately run settlement systems and therefore have to cover their costs. By interconnecting the RTGS systems, central banks would largely obviate the need for payment service providers to use correspondent banking arrangements, allowing them to save liquidity and to offer their customers more reliable, faster and

¹⁰ AliPay is part of the AntFinancial group, which houses the financial services of the Chinese conglomerate Alibaba. Several segments of the financial sector coexist there, including online payment with AliPay, wealth management with Ant Fortune, online banking and micro-credit for SMEs with MYbank, and credit risk assessment with Sesame Credit. As a result, AntFinancial has multiple licences to carry out many activities in the financial sector. The services are all offered online, target almost the entire Chinese population via the widespread use of smartphones in the country and enable the group to price services and manage risks appropriately, thanks to the collection of high-quality social and financial data on clients (Citi, 2018).

probably also cheaper settlement of their international transactions. In addition, financial stability would be strengthened through the settlement of transactions in central bank money.

3.2 Regulators' responses

"Same business, same risks, same rules" and a consistent regulatory approach among potential SC user countries are the regulatory guidelines proposed by the G7 working group on GSCs (G7, 2019). Following the work of the latter, a Financial Stability Board (FSB) working group was set up to indicate the various regulations to be applied accordingly to each aspect of GSC activity. The first response of regulators is therefore to coordinate in order to avoid regulatory arbitrage.

However, since regulations differ according to the nature of the assets concerned (*e.g.* money or securities), regulators must also consider the legal classification of the SCs (Mersch, 2019). In particular, there are three options for off-chain guaranteed SCs, which are the most common ones. The first is to consider them as money market funds, in that they invest in principle in low-risk, short-term assets denominated in the currency to which they are backed, with the aim of maintaining a constant value, since each unit issued can be assimilated to a money market fund unit, even in the case of basket SCs. The second option would be to consider SCs as electronic money on the grounds that SC units are intended to be used as a payment instrument and that their issuer undertakes to redeem them at par. This second qualification would entail much stricter regulatory constraints for issuers than the first, for example in Europe with the 2009 European directive on electronic money, which includes capital requirements and the obligation for the issuer to be able to redeem holders at par at any time. The third option, which FINMA (the Swiss Financial Market Supervisory Authority) has chosen for Libra, and which does not exclude the first or the second, is to treat SCs as payment systems since they circulate units on a blockchain for this purpose.

What are the risks arising from SCs that are not addressed by the regulations currently applicable to traditional financial or payment instruments and which would therefore require regulatory adaptation?

- Widespread use of GSCs could be accompanied by their use for money laundering and terrorism financing purposes, in contravention of the LCB-FT regulations. Indeed, users of Libra (Libra, 2019) could, in order to protect their privacy, carry out transactions under pseudonyms,¹¹ which is hardly compatible with compliance with regulations;
- Regulators could take into account the risks to financial stability described above, including the risk of a liquidity crisis, by imposing prudential requirements on SCs (see below);
- The protection of data from commercial exploitation by issuers could also be taken into account by regulators. Many concerns have been raised about the use of this data by Libra, an initiative of the Facebook group whose behaviour in this area has not always been exemplary in the past;

¹¹ When a user receives a payment, it would not be possible to know the real identity of the recipient unless the sender disclosed it (Abraham and Guégan, 2019).

- Finally, regulators could ensure that the blockchains used in SC projects are operationally resilient. Indeed, the scalability of the blockchain to the number of transactions recorded is not yet certain. It is within this framework that the Libra project foresees, in order to avoid possible congestion, an increase in tariffs in line with Libra demand (Libra, 2019), in order to reduce this demand and avoid congestion. Faced with this measure, regulators could, for example, introduce insurance for customers on the maximum time limit for the transfer of their applications (Abraham and Guégan, 2019). Also, in the event of a cyber-attack or hacking of the blockchain, the procedures put in place by the SC project holders to limit the risks should be clearly explained and provision made for compensating legitimate holders.

3.3 Central bank responses

Central banks can respond to the risks to financial stability and monetary policy posed by GSCs at two levels: the level at which they usually operate, *i.e.* the national level or, for monetary unions, the area level, but also at the international level.

3.3.1 Responses at national/area level

Two types of measures are possible, depending on whether they are defensive (central banks adapt their policies and instruments to the new context posed by the expansion of GSCs) or offensive (central banks propose their own solutions, in competition with GSCs).

At the defensive level, emerging countries already often apply exchange controls and could treat CS as foreign currencies. In addition, measures comparable to those taken in the case of dollarisation (Baliño *et al.*, 1999; Gulde *et al.*, 2004; De Nicolò *et al.*, 2005) could be adopted in the following two areas:

- Prudential policies, with the strengthening of liquidity requirements, to cope with potentially more frequent runs in countries that do not issue the reference currency (or currencies) of the GSC.¹² Obtaining credit lines in foreign currencies and setting up foreign exchange swaps by resident banks with foreign institutions would be part of the same approach. The central bank could also strengthen its capacity to support its banking system by increasing the level of its foreign exchange reserves (Jeanne and Rancièrè, 2011) and by participating in foreign exchange swap networks between central banks (Moessner and Allen, 2010). Finally, credit distribution in GSCs should be subject to close supervision, or even to a specific regulatory framework, to prevent a sudden depreciation of the exchange rate from causing financial instability. On the other hand, in countries issuing the reference currency, allowing the GSC to hold central bank reserves, as suggested by Adrian and Mancini-Griffoli (2019), would not eliminate credit and liquidity risks, even if the GSC issuer committed to cover all of its issues with reserves. Indeed, the latter could default by failing to meet its commitments or be subject to a run when the central bank is closed. Would it be a single access to the liabilities on the central bank's balance sheet, such as the one the Bank of England provides to a few payment service providers (six out of the six

¹² As indicated above, the assimilation of SC issuers to electronic money issuers would also subject them to liquidity requirements.

hundred or so institutions in London), or would it also be an access to its assets, i.e. to refinancing? In fact, a moral hazard would be created because, in the event of a run on a GSC issuer with full coverage of its reserve holdings, the public might not understand that the central bank is not coming to its rescue, even if it is mismanaged. Compared to the issuance of an MDBC (Pfister, 2019, 2020), this measure would also not prevent disintermediation in the banking sector. Simply put, this disintermediation would allow the private sector to capture an additional rent to the seigniorage received by the central bank when issuing reserves to meet the demand of the issuer of GSCs. As a matter of fact, the issuance of SCs fully backed by reserves could co-exist with, rather than replace, the CBDC issue;

- Monetary policy, with a possibly important role for the exchange rate. If a GSC gives rise to substitution in transactions (*currency substitution*), the adoption of a fixed exchange rate system vis-à-vis the reference currency, or even the GSC if it refers to a basket, for example, may be justified in order to protect the economy from exchange rate shocks. However, this measure obstructs the exchange rate channel; more importantly, it creates the risk of a conflict of objectives between exchange rate stabilization and economic stabilization. If the substitution is asset-based (*asset substitution*), it may on the contrary be prudent to adopt a flexible exchange rate system in the first instance. Indeed, uncertainty about exchange rate movements may dissuade potential users from holding GSCs (this obviously requires that the exchange rate risk be "both ways", i.e. upwards and downwards). However, switching to a fixed exchange rate may be necessary in a second step if the substitution has become very large.

At the offensive level, central banks could issue CBDCs to counter SCs (Pfister, 2019, 2020). However, this could cause difficulties that for their banking sector, whose resources would be affected by the substitution of CBDCs for deposits. Furthermore, it is not certain that this would be an adequate response to the risk of marginalisation of the domestic currency by retail GSCs resulting from a lack of confidence in the legal tender or in the national financial system or from the inefficient functioning of domestic payments systems. Finally, it remains to be seen what would make a retail GSC successful. If, as Adrian and Mancini-Griffoli (2019) argue, it is the way it fits into an integrated ecosystem providing messaging, search engine, e-commerce, financial and payment services, and constituting a "digital currency zone" (Brunnermeier *et al.*, 2019), then the issuance of a retail CBDC would not necessarily be successful.

3.3.2 Responses at the international level

At the international level, there are three types of responses to be considered:

- A defensive response requires coordination, both of central banks and of all regulators, and is the minimum response. The G7 (2019) calls for this, both because CSGs are global in nature and to avoid regulatory arbitrage;
- An offensive response, referred to above as a private sector response since central banks would in this case behave as service providers who would have to cover their costs, would be for them to interconnect their RTGSs;
- Issuing a global digital currency would also be an offensive response. This proposal was formulated by Carney (2019) as a public "Synthetic *Hegemonic Currency*" (SHC) providing an

alternative to Libra, and also intended to replace the dollar in international payments. This public SHC could be provided through a network of MDBC's and would therefore *a priori* take the form of a basket. The benefits cited are twofold: to reduce the dollar's influence on international trade, exchange rates, and global financial conditions and thus reduce the volatility of capital flows to emerging economies; and to gradually make the currencies other than the dollar making up the basket appear as reserve currencies as the use of the SHC spreads, thereby increasing the supply of risk-free assets and reducing the downward pressure on the equilibrium interest rate (Caballero and Farhi, 2018). In this perspective, Cœuré (2019) proposes that central banks with global reach join forces to jointly investigate the feasibility of CBDC's based on common technical standards. However, the question arises as to why an already existing instrument, intended to serve as a SHC and taking precisely the form of a basket of currencies, namely the Special Drawing Rights (SDRs), has not been able to assert itself in international monetary relations beyond its role as a unit of account and, in particular, has had no success with the private sector (Eichengreen, 2019). It also remains to be seen who would determine the composition of the basket and on what criteria, what would be the status of the CHS in the different economies (would it be reserved for international transactions?), who would issue it and how it would be combined with the currencies of the different countries or zones. Moreover, this proposal would take time to be implemented, while private initiatives are already well advanced and could be difficult to reverse once in place, as payment systems are at the origin of strong network effects, with *winner takes all* consequences. Finally, it remains to be asked whether the interconnection of the RTGS's, which is mentioned more in terms of private sector responses insofar as central banks would play an entrepreneurial role, might not be a more realistic and faster route, without, of course, constituting a response to the hegemony of the dollar.

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