Special Feature A

Digital Currency Economics And Policy Workshop[1]

"I think that the Internet is going to be one of the major forces for reducing the role of government. The one thing that's missing, but that will soon be developed, is a reliable e-cash, a method whereby on the Internet you can transfer funds from A to B, without A knowing B or B knowing A. The way I can take a $20 bill, hand it over to you, and then there's no record of where it came from."

– Milton Friedman, 1999

Introduction

In November 2018, the Economic Policy Group (EPG) of MAS, together with the Asian Bureau of Finance and Economic Research (ABFER), and the National University of Singapore (NUS) Business School co-organised a two-day workshop to explore the economics of digital currencies and their implications for monetary and regulatory policies. Leading academic researchers in monetary and financial economics were invited to speak at the workshop, which attracted a large number of participants, including central bankers, academics, and practitioners in the financial industry.[2]

Digital forms of currency are not new. Over the last few centuries, money has taken various forms other than physical cash. For instance, payments by telegraphic wire began to be effected in the nineteenth century, while modern credit cards emerged in the 1950s. Present-day monetary systems are already mostly digital, comprising customer deposits held with commercial banks, and bank reserves held by commercial banks with the central bank. The latter, together with cash in circulation, forms the monetary base which is the basis for money creation by commercial banks through lending activities. Notably, the system requires a trusted third party to keep track of transactions on a centralised ledger—the commercial bank for customer deposits, and the central bank for commercial bank reserves.

The innovation behind the distinctively new form of digital currency that was the workshop's focus is Distributed Ledger Technology (DLT), which allows transactions to be recorded and verified on a decentralised ledger, without the need for a trusted third party acting as central bookkeeper of the system. Applied to currencies, it renders possible the private 'e-cash' which Milton Friedman hypothesised two decades ago, with no single authority responsible for, or privy to, the history of transactions.

DLT has in turn given rise to two novel developments. The first is the proliferation of

1 This article is a summary of the workshop discussions and does not necessarily reflect the views of the MAS. It has further benefitted from comments by Professor Bernard Yeung, President of the Asian Bureau of Finance and Economic Research, Dean and Stephen Riady Distinguished Professor, NUS Business School and co-organiser of the Digital Currency Economics and Policy Workshop.

2 The speakers and discussants at the workshop were Franklin Allen (Imperial College London), Robleh Ali (MIT), Markus Brunnermeier (Princeton University), Barry Eichengreen (University of California, Berkeley), Charles Engel (University of Wisconsin-Madison), Gur Huberman (Columbia University), Randall Morck (University of Alberta), Danny Quah (NUS), Kenneth Rogoff (Harvard University), Andrew Rose (University of California, Berkeley), Prateek Saxena (NUS), Beatrice Weder di Mauro (INSEAD Singapore), David Yermack (New York University) and Bernard Yeung (NUS Business School). Materials from the workshop are available at the ABFER website.

private digital currencies following the emergence of Bitcoin in 2008, which are outside the fractional reserve banking system in that they are not liabilities of the central bank. The rise of these so-called 'cryptocurrencies' has compelled policymakers to address illegal transactions using this medium as well as the associated consumer protection issues. More important, the advent of digital currencies has implications for the effectiveness of monetary policy and financial regulation. Some central banks are also considering issuing their own digital currency (CBDC). The novelty of a general-purpose CBDC accessible to the public is that it puts retail money creation in the hands (and on the balance sheets) of central banks, and not commercial banks.

Accordingly, the workshop discussion centred around three questions. First, what are the macroeconomic and financial implications of private digital currencies, and do they have a future? Second, what are the concerns and gains in introducing a CBDC? Third, what potential does DLT hold, regardless of whether it is applied to private or public currencies? This Special Feature summarises the key points and views presented at the workshop on each of these issues.

Private Digital Currencies: Have They A Future?

At the workshop, speakers took reference from the economic functions performed by money to illustrate their arguments. Traditionally, money can be viewed as providing a means of payment, a unit of account, a store of value, and a standard for deferred payment.[3]

A substantial part of the discussion on private digital currencies revolved around the issue of whether they might fulfil these functions more efficiently than existing monies. It was almost a consensus at the workshop that, in practice, private digital currencies are found wanting.

The value of private digital currencies is too volatile to serve as a meaningful unit of account and store of value. Recent history bears this out, with the market capitalisation of cryptocurrencies falling by 80% over 10 months from January to November 2018. While some cryptocurrencies have adopted various collateralisation strategies to minimise price volatility, they continue to face constraints. For example, so-called 'stable' coins such as Tether that require 100% backing by a traditional currency are very expensive to operate, while partially collateralised coins are vulnerable to losses in confidence, akin to currency pegs.

Participants also pointed out that, at present, payments using private digital currencies form only a miniscule share of total global transactions, and are by and large confined to illegal activities such as money laundering, black market transactions and drug trades.

One often-raised concern is that private digital currencies could replace government-backed money entirely. However, most discussants held the view that private digital currencies will have only a very limited, if not totally negligible, impact on money creation. Historically, only countries with very high inflation rates have experienced large-scale currency substitution. This observation implies that private digital currencies are highly unlikely to affect the operation of monetary policy and the functioning of the international monetary system.

Several speakers pointed out a clear historical tendency towards the central sovereign control of currency issuance. The driving forces behind this centralising tendency—even though it has been incomplete at most times in history, with the co-existence of commercial bank-issued cash such as in Scotland—are three-fold. First, governments require control of currency creation (and seigniorage) to be a lender of last resort and possibly to mobilise resources in case of a national emergency. These are important responsibilities which cannot be relinquished to a system for which no one is fully accountable. Second, having a uniform national currency

[3] Jevons (1875) defined money by these four characteristics in *Money and the Mechanism of Exchange*. However, textbooks nowadays skip the fourth item, see for example Mankiw (2007).

reduces transaction costs and raises efficiency, since there is no need to retain information about the creditworthiness of multiple means of payment. Third, as private digital currencies do make it easier to evade capital controls, bypass financial regulation, and facilitate illegal activities, governments have little incentive to allow private digital currencies to flourish.

Governments can secure their control over money creation by reducing the liquidity of private digital currencies, for example through banning their use in making payments and disallowing their convertibility into legalised currencies. Moreover, if governments can cooperate internationally to make these currencies almost completely illiquid, their use in tax evasion and other criminal activities would be drastically reduced. Once outlawed, it would be difficult to launder cryptocurrencies back into the financial system.

Relatedly, one scenario presented at the workshop showed that access to a digital currency helps to discipline governments: the ability of private agents to substitute into digital currency could serve as a credible threat forcing governments to constrain their setting of overtly punitive inflation taxes. At the same time, private digital currencies offer investors portfolio diversification options.

The potential for cryptocurrencies to exert a disciplining effect on sovereigns otherwise tempted to inflate rests on its status as 'digital gold'—an asset that is fixed in supply by its nature. However, some participants noted that the code for Bitcoin is open source and therefore replicable. An individual cryptocurrency's supply may be limited, but the potential for 'forking', resulting in an instant doubling of the number of coins in circulation, renders the aggregate supply limitless in principle. The risk of such debasement is not just theoretical, as a forking of Bitcoin Cash occurred in November 2018 and precipitated a sharp decline in the value of most cryptocurrencies, including the original Bitcoin.

To sum up, it is difficult to identify a clear basis for the demand for private cryptocurrencies, so long as there is a reasonably well-functioning, rules-based monetary and financial system. More importantly, private digital currencies fall short of the characteristics necessary for them to function as money; in particular, in-built price volatility makes them poor stores of value. In the absence of a compelling business case, outside of extreme situations of hyperinflation or financial system collapse, a broad consensus emerged among workshop participants that such cryptocurrencies remain at best 'a solution in search of a problem'; and even then a solution with flaws of its own.

What About Central Bank Digital Currencies?

Another theme taken up at the workshop was the prospect of digital forms of currency supplanting physical cash. In Sweden for example, cash has already fallen to around 1% of GDP. Participants discussed the implications of this trend and whether it might compel central banks to ultimately issue their own digital currencies. The most radical innovation on this front would be the introduction of CBDC on a retail level, accessible by households and businesses throughout the economy.

The implications of such a change would be profound, with participants expressing some concerns. First, speakers noted that CBDCs would have grave financial stability implications. It would compete away private banks' low-cost deposits, which would fundamentally raise the banking system's risks. Facing a reduced supply of low-cost loanable funds and lower profitability, banks would be forced to seek costlier sources of funding and accordingly have to make riskier investments, leading to increased risks to financial stability.

Second, a comprehensive CBDC could increase both the likelihood and severity of bank runs. If the financial system comes under stress, a general-purpose CBDC would be perceived as the safest and most liquid asset, which might induce depositors to move their savings out of private banks into the central bank—this could be done with a click of a button. Depending on how a CBDC is introduced, a 'digital run' could be triggered even without a financial crisis. In principle, the resulting system would resemble

the narrow banking proposals of Irving Fisher in the 1930s Chicago Plan, or the more recent plans for 'sovereign money'.[4]

Third, a host of separate issues would arise with respect to how the central bank should manage its greatly-expanded balance sheet and recycle deposits back into the economy. It is not clear that central banks should engage in the business of credit creation from an allocative efficiency point of view.

On the positive side, participants noted some potential benefits of a CBDC. If cash were replaced entirely, central banks could be accorded greater flexibility and potency in monetary policy implementation. Negative interest rates can be imposed on CBDC deposits, thus circumventing the 'zero lower bound' constraint. Furthermore, the authorities could effect 'helicopter drops of money' in a targeted manner by crediting households' bank accounts directly.

Another potential benefit was cited in connection with the fight against crime. CBDC can give policymakers access to digital records (assuming the central bank managed the ledger), yielding useful real-time information. The authorities could then improve the enforcement of rules aimed at anti-money laundering, countering the financing of terrorism, and curtailing informal economic activities and tax evasion.

Some participants considered whether a CBDC could replicate the anonymity of cash. Although a general-purpose CBDC may promise privacy in payments by keeping transactions data housed within the central bank, concerns about data security imply that a CBDC may fall short of guaranteeing full anonymity. Ultimately, privacy can substitute for anonymity only if there is sufficient trust in the ability of public institutions to keep data secure. Some participants questioned whether an anonymous payments system was in fact a core public good that governments should provide, while others thought that this was an issue that should be resolved through the broader political process.

On the whole, it remains unclear if the benefits of having a CBDC outweigh the challenges. Some central bankers at the workshop suggested that a focus on developing a digital payment infrastructure that relies on a mix of public and private entities may be a superior alternative to a general-purpose CBDC. Policymakers can then continue to ensure price and financial stability while commercial banks hold the majority of deposits. In other words, accelerating the adoption of digital payments while retaining the current foundations of money creation would preserve public trust in a well-functioning monetary system, and avoid the macroeconomic distortions that could come with a CBDC.

As a case in point, Sweden is actively pursuing this strategy. Commercial banks in Sweden are jointly building a payment infrastructure to support cashless transactions, such as shared automated clearing houses and instant payment mobile applications. At the same time, the Swedish population is highly adaptable to new technology and merchants are also under no legal obligation to accept cash. Such a rapid adoption of digital payment technologies by commercial banks, within a system where digital cash is underwritten by accountable public institutions such as the deposit insurance agency and central bank, may have obviated the need for a general-purpose CBDC.

[4] Proposals for a narrow banking system call for a separation of household savings from risky lending by financial intermediaries. Practically, this can be achieved by having safe banks (possibly the central bank) park deposits in liquid and safe assets, while other financial intermediaries invest in risky assets. Proposals for sovereign money, such as the Swiss National Bank's Vollgeld Initiative, call for giving central banks the sole authority to create money. This stands in contrast to fractional reserve banking systems in most countries where private commercial banks are responsible for the bulk of money creation.

The Promise Of Distributed Ledger Technologies

A number of speakers at the workshop discussed the perceived merits of DLT. This technology allows transactions and data information to be distributed in an encrypted and digitised manner across a network of different participants. After all participants have collectively verified the authenticity of the shared information according to a pre-defined algorithmic validation process, the transferred digital information will be identically recorded by all. Thus, information transfers can be achieved without verification by a centralised third party. This feature has the potential to be tremendously useful in a range of financial and non-financial applications.

Aside from filling gaps in the provision of payment services, DLT payment systems promise to bring gains in economic efficiency. Specifically, DLT allows for the free entry of ledger writers; hence, it will tend to prevent a centralised ledger keeper from earning economic rents. Moreover, the forking feature on platforms like Bitcoin, which allows competing ledger writers access to the same information as the incumbent writer, provides an additional layer of competition that can further reduce rents.

DLT-based payment systems will also bolster financial system resilience by eliminating central points of failure. Specifically, such systems insulate users from the default and operational risks arising from the reliance on a central counterparty in a centralised ledger. For example, if a traditional commercial payment system defaults or experiences a cyber-attack, all transactions performed using that system may be rendered void, a risk that users of a DLT-based system will not face.

Fundamentally, there is a trilemma facing payment systems in general, where only two out of three appealing traits of correctness (i.e., ensuring the payment record is accurate), decentralisation, and energy efficiency, are achievable. DLT payment systems attain decentralisation but achieve correctness in an energy-expensive manner. Essentially, energy-wasting replication of validation efforts is necessary to incentivise correct record-keeping among decentralised ledger writers. This limits the number of transactions that DLT payment systems can process, making such platforms very difficult to scale up. These trade-offs suggest that the potential for DLT-based private digital currencies to replace traditional currencies as the dominant medium of exchange is still limited at present. Even the largest DLT private currency, Bitcoin, performs merely a small fraction of the transactions currently processed by Visa or MasterCard, while consuming much larger amounts of energy.

Besides the application to payments, DLT has also been increasingly harnessed for another key function of the financial system—borrowing and lending services. On this note, one speaker provided an overview of Initial Coin Offerings (ICOs), an increasingly popular way for firms to raise capital. ICOs allow firms to borrow by issuing coins that can then be traded on cryptocurrency exchanges. Thus, ICOs enable firms to raise funds from international investors without needing to meet local legal standards of issuing debt or equity. At the same time, however, the lack of regulatory oversight has led to relatively high instances of scams among ICOs. Hence, there is a need to regulate ICOs, along the lines of Rule 144A in the US, to ensure only qualified investors can participate in them.

Conclusion

A key conclusion that emerged from the workshop was that cryptocurrencies such as Bitcoin do not currently pose an existential threat to traditional central bank-managed monetary systems. Traditional monetary systems continue to provide money that meets society's needs as a means of payment, store of value and unit of account in almost all jurisdictions globally.

Further, independent but accountable central banks are still needed for stability in the value of money, and existing payment systems continue to be relatively secure and efficient. Conversely, cryptocurrency advocates have so far failed to make a convincing business case that private digital currencies can perform any of these functions more efficiently than traditional money, given the significant costs associated with their use arising from high energy requirements and issues of governance and replicability.

Likewise, while using e-payments instead of cash is a globally growing practice, most central banks do not expect CBDC to be introduced in the near future. Introducing a retail CBDC would be similar in many respects to moving to a narrow banking model, entailing profound and risky changes to the financial system. The putative disappearance of cash would pose the further social and ethical question of whether it should be the responsibility of the sovereign to provide an anonymous means of payment. While of great interest and importance, this question fell outside the scope of the workshop.

Blockchain and DLT technologies that underpin cryptocurrencies have many other potential applications. Central banks, including MAS, are already working on concrete applications of DLT to clear international payments, for example. The workshop saw widespread interest in exploring further how the new technologies might make existing payment systems more efficient.

By bringing together researchers and practitioners, the workshop highlighted the rapid pace of development in the field, and also showed how many of the issues raised can be understood in terms of established economic theory, even though they have new policy implications. Both theory and practical experience support the view that the capacity of private and public digital currencies to serve as money is limited at present, given the state of the technology. However, this conclusion is provisional, pending further developments in DLT and other market considerations, including a rising demand for anonymity in transactions amid growing concerns around data privacy.

References

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