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Monetary Reform and Central Bank Digital Currencies: The Impact on Retail Banking

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Abstract: This research aims to clarify the impact of monetary reform on retail banking, with the introduction of private crypto-currencies (CCs) and retail central bank digital currencies (CBDCs). Given the exponential increase in private de-centralized CCs, involving stablecoins and non-backed digital assets, total crypto assets have now developed into a USD 1.04 trillion market capitalization. Governments and monetary authorities were initially reticent, but now a number of central banks are developing their own wholesale and retail CBDCs. By conducting library research, document and content analysis involving secondary data, this research confirms, involving central bank admission, that the current centralized monetary system allows commercial banks to lend the vast majority of deposit money into existence. However, the impact of private CCs and introduction of retail CBDCs will eliminate credit creation, thus rendering the commercial banking model obsolete. This will inevitably involve a structural change in the global financial system, with the separation of the public issuance of money and the private issuance of equity finance and investment. Ultimately, retail CBDCs will have to develop into public stablecoins that are pegged to intrinsic value to satisfy the store of value function of money and provide stability as the common denominator for all economic transactions.

Keywords: Monetary policy, central banking, credit-creation, crypto-currencies.

JEL Classification: E42, E51, E52, E58

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Introduction

In the context of monetary reform, this study examines the introduction of central bank digital currencies (CBDCs) and its impact upon modern commercial banking and the financial system. Interestingly, commodity money in the form of precious metals and crypto-currencies (CCs) share similar characteristics in that they both involve de-centralized monetary and payment systems that reflect an instrument of transfer. Indeed, historically in Islam, money (the *dīnār* and *dirham*) is defined as an instrument of transfer (Al-Ghazali, 2004) that can never be traded for a profit (interest): "The creation of *dirhams* and *dīnār* is one of the blessings of *Allah*… A mirror, which has no color, but it reflects all colors. The same is the case of money. It is not an objective in itself. But it is an instrument to lead to all objectives" (Al-Ghazali, 2004). However, mainstream economics defines money as a commodity that comes at a price (interest) in order to justify a theory of interest and a theory of banking. Historically from a conventional perspective, commodity money was anything that contained intrinsic value. The modern interpretation of a commodity means anything of value in a standardized form that permits economic transactions to be undertaken in organized markets. As such, fiat money is standardized and deemed a commodity in the modern sense, but is not collateralized, or backed, by any valuable commodity (Mishkin, 2019). Mainstream economists therefore regard money "as anything that is generally accepted in payment for goods and services" (Mishkin, 2019, p.56) and for the repayment of debts, such that money is defined by its function (as a means of payment) rather than by its form (whether precious metals, paper or electronic money). Accordingly, conventional economists have regarded the form and functions of money in the context of "the evolution of the payment system…Where the payment system is heading has an important bearing on how money will be defined in the future" (Mishkin, 2019, p.53).

From an Islamic perspective, currency has been defined as: "*Nuqud* is the plural of *naqd* and is composed of gold and silver" (*Majallah*, Art. 130), but *naqd* also means the payment of a price in *an-nuqud*, as per the *hadith* of Jabir, "He [the Prophet s.a.w.s.] paid (*naqada*) me its price" (Muslim, 10:3886). Furthermore, the *Qur'ān* explains the four primary functions of money in terms of gold and silver. It mentions the *dīnār* (3:75) as a unit of account and standard of deferred payment, regarding some of the *ahl al-kitab* whom cannot be trusted to repay even a *dīnār* unless you stand over them. The *dirham* is mentioned in the *Qur'ān* (12:20) as a unit of account and medium of exchange involving the merchants who found Yusuf (a.s.) in the well and later sold him for a few *dirhams* to Al-Aziz in Egypt. A

silver coin (*wariq*) is also mentioned in the *Qur'ān* (18:19) as medium of exchange for the occupants of the cave to purchase lawful food. Also, gold is mentioned in the *Qur'ān* (3:91) as a store of value, such that upon realizing the truth after death, even if a disbeliever offered a ransom the size of the earth in gold, it would not be accepted by Allah (s.w.t.).

Furthermore, from an Islamic perspective there is a fifth function of money, since the *hadith* clarifies *Shari'ah* legal injunctions involving *an-nuqud* (the *dinar* and the *dirham*) in imparting justice. "The *Shari'ah* has mentioned (the *dinar* and the *dirham*) in connection with many laws concerning *zakat*, marriage (*mahar*), *hudud* and other things…upon which its judgements may be based. These coins are then the ones to which the laws refer. They are different from the non-legal (coins)" (Ibn Khaldun,1958, p.58). In other words, the scholars knew the exact purity and weight of the legal or *Shari'ah dinars* and *dirhams*, which sometimes differed in fineness and weight between other non-*Shari'ah dinars* and *dirhams*. The legal *dinar* equalled the weight of a *mithqal* which "weighs seventy-two average-sized grains of barley (*habbahs*). Consequently, the *dirham*, which is seven-tenths of a *mithqal*, has a weight of fifty and two-fifths grains" (Ibn Khaldun, 1958, p. 58 & Al-Maqrizi, 1994, pp. 57-61), and the modern equivalent weights are 4.25g and 2.975g, respectively, as reflected in surviving coins and glass weights (Abdullah, 2020). The primary reason for including the legal *dinar* and *dirham* in *Shari'ah* legal requirements is that gold and silver retain their store of value function of money and through these units of account, they can therefore consistently contribute to imparting justice.

In the *hadith,* the Prophet (s.a.w.s.) specifically mentions the *dīnār* and the *dirham* in seven *Shari'ah* injunctions: *zakat*, *jizya* (tribute tax), *kharaj* (tax on conquered land), *diyat* (blood-money), *sariqa* (stealing), *mahar* (dowry) and *sarf* (currency exchange) (Abdullah, 2022, p.8). Since gold and silver do not change in value over the long term, so there would be no distortion in imparting justice. Even today, we are still using the Islamic monetary standard when we determine the *nisab* for *zakat*: the modern equivalent weight for a *dīnār* is 4.25g and the *nisab* is 20 *dīnārs*, so the *nisab* of gold today is the market value of 85g of pure gold. Indeed, all of the Prophets would have relayed to their societies the pillars of Islam and the importance of *zakat*, including the role of the *dīnār* and the *dirham*. Al-Maqrizi (the student of Ibn Khaldun) mentioned that "the first to mint the *dinar* and the *dirham* was Adam, who said that life is not enjoyable without these two currencies" (Al-Maqrizi, 1994, pp.55-56).

From a classical perspective, a number of Muslim scholars, including Al-Muqaddasi, Ibn Qudamah, Abu 'Ubayd al-Qasim, Al-Mawardi, Imam Al-Ghazali, Ibn Taymiyyah, Ibn Qayyim, Ibn Khaldun and Al-Maqrizi (Abdullah, 2022, p.9), differentiated between a wider medium of exchange (*wasilat al-tabadul*) and currency in terms of gold and silver (*an-naqud*). Since, there is no compulsion in religion there can be no compulsion in a medium of exchange. However, there is a cause and effect of ignoring a medium of exchange that fails to retain its store of value, since the purchasing power of money its inversely related to prices. Therefore, a medium of exchange that loses its purchasing power is unable to protect our wealth, since wealth would be confiscated through inflation and this is contrary to one of the objectives of the *Shari'ah* (*maqāsid al-Sharī'ah*), which is the protection of wealth (*hafiz al-mal*). Such a medium of exchange would not be operating in the public interest (*maslahah*), but instead would be very harmful (*darar)*, given that money is the common denominator of all economic transactions (Abdullah, 2018). Whilst the U.S. consumer price index (CPI) rose to 9.1% in June 2022 (BLS, 2022), the Bitcoin (BTC) price has fallen from USD 46,700 in Jan. 2022 to USD 22,500 in Jul. 2022 (Coinmarketcap, 2022a), implying that BTC is not a hedge against inflation. Meanwhile, the USD itself under the fiat standard since 1971, has lost 98% of its value in relation to gold (Abdullah, 2013, 2016).

From a conventional perspective, Friedman and Schwartz (1970) regarded the definition of money as a legitimate on-going discussion within the management of money supply: "…the best way to define money, remains a live issue today… The definition of money is an issue to be decided, not on grounds of principle…but on grounds of usefulness in organizing our knowledge of economic relationships. There is no hard and fast formula for deciding what total to call 'money'" (Friedman et al., 1970, p.104). Money may involve a specific definition of currency on one hand reflecting the essential function of money as a medium of exchange, through to a much wider definition involving "liquidity as the essential feature of money" (Friedman et al., 1970, p.90). In emphasizing the medium of exchange function of money, Friedman states, "it begs the question of whether the 'essential' feature of money is its use as a means of payment. A 'money' economy is distinguished from a barter economy by the separation of the act of purchase from the act of sale… In order for the act of purchase to be separated from the act of sale, there must indeed be something that will generally be accepted in payment" (Friedman et al., 1970, p.106). So, Milton Friedman articulates that fiat money is primarily useful as a means of payment. Keynes (1936) clarified that "As a rule, I shall, as in my *Treatise on Money* [1930], assume that money is co-extensive with bank deposits"

(Keynes, 1936, p.167). Nonetheless, Carroll (1964) succinctly observed regarding bank deposits: "The origin of this debt currency, or bank money, generally called 'paper money'…explains its nature. It is debt organized into currency through the agency of a bank" (Carroll, 1964, p.100).

With regard to the origins of contemporary CCs, Muhammad ibn Mūsā al-Khwārizmī, the great Persian scientist, published a seminal work on mathematics entitled *al Jibr* during the reign of Caliph al-Mamun (813-833) in Baghdad. His mathematics was derived from the Islamic Law of Inheritance (*fara'id*) in the *Qur'ān* (*Surah An-Nisa, Al-Qur'ān*:4). In *al Jibr*, he developed algebra including linear and quadratic equations with Western Arabic numerals, and his arithmetic was also useful for determining profit ratios and returns from *mudharabah* and *musharakah* Islamic equity investment partnerships (Al-Khwārizmī, 1930). His work was later copied by Fibonacci of Pisa in his *Liber Abaci* of 1202 (Fibonacci, 2003) that replaced Latin numerals with Western Arabic numerals including the important introduction of zero (*sifr*). However, Fibonacci added interest calculations that became useful for the Lombards, Goldsmith bankers and money lenders of Europe. Ultimately, the English word algorithm is named after Al-Kawarizmi and algebra, which became a separate field of study, was named from his book *al Jibr*, that would later develop algorithms that the internet generally and crypto-currencies specifically would rely on. With the advent of Bitcoin (BTC), Nakamoto (2008) imagined BTC as a digital peer-to-peer cash payment system, and in this sense, the definition of money became a means of payment as Friedman and Schwartz (1970) envisaged. Nonetheless, science flows from the *Qur'ān*, such that algorithms, which are central to blockchain, artificial intelligence (AI), big data, data science and FinTech, have all combined to disrupt commercial banking, which is based on credit creation from lending at a risk-free rate of interest (*riba'*), calculated at the time value of money (TVM).

Accordingly, the central theme of this study, seeks to develop empirical knowledge through library research, document and content analysis, derived from secondary data, by analyzing whether commercial banks can operate alongside CBDCs, given the impact on credit creation and the issuance of money. As such, by focusing on central bank admission, this study reveals that private CCs and retail CBDCs will render the commercial banking model obsolete. This will inevitably involve a structural change in the global financial system, with the separation of the public issuance of money and the private issuance of equity finance and investment. Accordingly, retail CBDCs will have to develop into public stablecoins that

are pegged to intrinsic value to satisfy the store of value function of money and provide stability as the common denominator for all economic transactions.

This would confirm that a medium of exchange must have intrinsic value (*'ayn*) rather than be debt-based (*dayn)* in order to operate in the public interest (*maslahah*). Accordingly, this study is organized into five sections including this introduction, with the second section providing a review of literature. The third section details the methodology, the fourth section presents the findings and analysis, and the fifth section provides some concluding remarks.

Literature Review

This section will review literature on money creation, the relationship between money creation and interest, in the context of the time value of money (TVM), and also on recent research concerning the latest developments in CCs in relation to this study.

Money Creation in a Modern Economy

In a modern economy, commercial banks provide a unique role in extending credit, a process that involves the creation of money in the money supply process. William Patterson, the first Governor of the Bank of England (BoE), on obtaining the charter of the BoE in 1694, stated: "the Bank has benefit of interest on all money which it creates out of nothing" (Quigley, 1966, p.49). Indeed, only licensed commercial banks are permitted to do this, as noted by Irving Fisher, "If the two parties, instead of being a bank and an individual, were an individual and an individual, they could not inflate the circulating medium by a loan transaction, for the simple reason that the lender could not lend what he didn't have, as banks can do… But if [an individual] incorporates himself into a commercial bank…he can do this very thing… Only commercial banks…can lend money, which they manufacture by lending it… by the same token two individuals cannot deflate the circulating medium." (Fisher, 1935, p.38).

The former Chief Justice of Pakistan and now Chairman of the *Shari'ah* Committee at AAOIFI, Taq Usmani, wrote a landmark *Judgment on Riba* in 1999, detailing the nature of usury (*riba*), and reaffirming the history of money creation with the goldsmith bankers of medieval England; "Initially, it was abuse of trust and a sheer fraud on the part of the goldsmiths not warranted by any norm of equity, justice and honesty. It was a form of forgery and usurpation of the power of the

sovereign authority to issue money. But overtime, this fraudulent practice turned into the fashionable standard practice of the modern banks …[who] are creating money out of nothing" (Usmani, 2001, pp.99-106).

However, for the first time in the history of modern banking, Prof. Richard Werner empirically established the underlying mechanics of modern banking in 2014. He noticed that the historical literature has recognized three theories of banking.

The *credit creation theory of banking* (Macleod, 1894) maintains that each individual bank creates money out of nothing and does so when it creates credit (deposits) from lending.

The *fractional reserve theory of banking* (Marshall, 1890) suggests that individual banks are mere financial intermediaries that do not create money individually, but collectively they create money through a systematic interaction when money is created (multiplied) through the textbook explanation of the money money-multiplier.

The *financial intermediation theory of banking* (Keynes, 1936), supposes that individual banks do not creating money and are merely intermediaries like other non-bank financial institutions, collecting deposits that are then lent out, as often described in modern textbooks.

By conducting a live loan transaction in a commercial bank and by recording the internal accounting and book-keeping entries, Werner (2014) empirically established that individual banks indeed create money out of nothing, thereby affirming the credit creation theory of banking, and dis-proving both the fractional reserve and financial intermediation theories of banking (Werner, 2014). Werner thus confirmed the original admission by Patterson in 1694 (Quigley, 1966, p.49), that the BoE creates money out of nothing, and the BoE is the pioneer model for all modern banks. In terms of substance over form, by empirically analysing the accounting entries of Islamic banks, Abdullah (2021) confirmed they also have adopted the same underlying business model associated with the credit creation theory of banking pioneered by the BoE. Islamic banks create money (deposits) from the simultaneous trading of assets which creates a debt (loan), in the form of a risk-free marked-up credit price calculated at the time value of money (TVM), i.e. an interest rate under the banner of a profit rate (Abdullah, 2021). Thus, the BoE is the pioneer model for all modern banks, whether conventional or Islamic.

Werner's empirical research on the credit creation theory of banking was also confirmed by the BoE in two papers entitled *Money Creation in a Modern Economy* (McLeay et al., 2014) and *Banks are not intermediaries of loanable funds - and why this matters* (Jakab & Kumhof, 2015). It was also confirmed by both the German Bundesbank, in an article in its' monthly report entitled *How money is created* (2017), and in a speech by Thomas Jordan, the Chairman of the Swiss National Bank, entitled *How money is created by the central bank and the banking system* (Jordan, 2018).

"Money creation in practice differs from some popular misconceptions - banks do not act simply as intermediaries, lending out deposits that savers place with them, and nor do they 'multiply up' central bank money to create new loans and deposits…In the modern economy, most money takes the form of bank deposits. But how those bank deposits are created is often misunderstood: the principal way is through commercial banks making loans. Whenever a bank makes a loan, it simultaneously creates a matching deposit in the borrower's bank account, thereby creating new money. The reality of how money is created today differs from the description found in some economics textbooks. Rather than banks receiving deposits when households save and then lending them out, bank lending creates deposits. In normal times, the central bank does not fix the amount of money in circulation, nor is central bank money 'multiplied up' into more loans and deposits" (McLeay et al., 2014, p.14).

"In the intermediation of loanable funds model of banking, banks accept deposits of pre-existing real resources from savers and then lend them to borrowers. In the real world, banks provide financing through money creation. That is, they create deposits of new money through lending, and in doing so are mainly constrained by profitability and solvency considerations…[As compared to financial] intermediation models, financing [through money creation] models predict changes in bank lending that are far larger, happen much faster, and have much greater effects on the real economy" (Jakab & Kumhof, 2015).

"The majority of the money supply is made up of book money, which is created through transactions between banks and domestic customers. Sight deposits are an example of book money: sight deposits are created when a bank settles transactions with a customer, i.e. it grants a credit, say, or purchases an asset and credits the corresponding amount to the customer's bank account in return. This means that banks can create book money just by making an accounting entry: […] this refutes a popular misconception that banks act simply as intermediaries at the time

of lending – i.e. that banks can only grant credit using funds placed with them previously as deposits by other customers" (Bundesbank, 2017).

"When a bank provides a loan, it credits the amount in question to the borrower in the form of a deposit" (Jordan, 2018, p.4).

However, the accounting nature of credit creation also reveals credit destruction. Ryan-Collins et al. (2012) observed that, "just as banks create new money when they make loans, this money is extinguished when customers repay their loans as the process is reversed. Consequently, banks must continually create new credit in the economy to counteract the repayment of existing credit" (Ryan-Collins et al., 2012, p.71). Wolf (2014) in his insightful *Financial Times* article entitled *Strip private banks of their power to create money*, realizes that money creation by banks requires governments and taxpayers to underwrite the banking system. Also, "printing counterfeit banknotes is illegal, but creating private money is not. The interdependence between the state and the businesses that can do this is the source of much of the instability of our economies. It could – and should – be terminated… Banks create deposits as a byproduct of their lending…What should be done?… First, the state, not banks, would create all transactions money… Second, banks could offer investment accounts [and] be stopped from creating such accounts out of thin air and so would become intermediaries that many wrongly believe they are now" (Wolf, 2014).

In summary, both conventional and Islamic banks are creating purchasing power from unfunded non-cash credits in the form of deposits (money), which are created from lending in the form of debt contracts on the asset side of their balance sheets. In a recent speech concerning the development of a Euro CBDC, the ECB is adopting a two-tiered approach, so that its CBDC will be issued by the ECB but distributed by banks and other existing financial institutions: "By distributing digital euro, intermediaries will play a key role" (Panetta, 2022). Yet, as we have seen from the above literature, are banks financial intermediaries? If this money was in form of CBDCs being issued only by a monetary authority, on what basis could a commercial bank continue its operations if it was no longer able to issue (create) money by itself? The implication would be that banks would become genuine financial or investment intermediaries, rather than lend money into existence at the TVM.

Time Preference and Interest (TVM)

As mentioned earlier, a theory of interest is inter-woven with a theory of banking, since a debt is greater than cash received, and the creation of additional money is

needed for society to pay for future interest obligations. With regard to the TVM, the view that a dollar today is worth more than a dollar tomorrow is related to the positive time preference theory of interest. In capitalism, generally there is always positive time preference, such that creditors are entitled to a pre-determined contractual profit (interest) on their loans as compensation for postponing current consumption. Accordingly, a creditor is being compensated at interest involving a positive time preference, hence the time preference theory of interest developed by Bohm-Bawerk (1844, 1888), which was formalized by Irving Fisher in his *Theory of Interest* (Fisher, 1930).

In contrast, Islamic economics gives a value for time based upon real activity (Swielem, 2011). In other words, time is not the subject of an independent trade, rather it is a corollary of the commodity sold. Time affects the determinants of price but, it is forbidden to assign a separate compensation to it. Khan (1991) argues that the "prohibition of interest in Islam denies any recognition of time value for money" (Khan, 1991). Islamic jurists have allowed a difference between the cash and credit price, or a sale on credit involving deferred payment (*bai' mu'ajjal*), but this does not legitimize a predetermined, risk-free time value of money at the rate of interest. The jurists, in his opinion, have allowed the difference in the cash and credit price because they recognized that the forces of supply and demand could differ at different times, which led the jurists to allow the future price in a *bai' mu'ajjal* transaction to be higher, lower, or equal to the present price (a positive, negative or zero time-preference). This has been echoed by Rosly (2005), who observed that many people have questioned why in contemporary risk-free simultaneous sales transactions, the credit price is always higher than the cash price, and the difference in price is calculated at the compound interest rate. The fact that the *Sharīʿah* allows the credit sale price to be different from the spot price implies recognition of a time preference associated with market risk. However, buying and selling without market risk (*ghunm*) would involve usury (Ibn al-'Arabi, 1957, p.10 & Rosly, 2005, p.30). Indeed, the Messenger of *Allah* (s.a.w.s.) said, "Beware, usury may be in bartering with deferred payment." (Muslim 10:3879), referring to a deferred credit price without market risk and priced at the TVM.

In essence, the conventional approach to the TVM involves money as the subject matter and priced at the compound interest rate and Islamic banks are replicating this under the banner of a profit rate (Abdullah, 2018). The Islamic perspective on time preference does not price time at interest, but rather prices are subject to market risk and supply and demand in the real economy rather than in any money

market. Money cannot be bought and sold at a profit, but goods must be subject to market risk and thus future prices can have a positive, negative or zero time-preference. Thus, if structing a combination of contracts priced at the TVM is called into question, the concept of a fixed return on savings must also be rejected if the nature of a deposit is a loan and not a bailment. From an Islamic perspective, CCs and CBDCs should not be charging interest, but any returns should accept market risk and be generated from profit-and-loss sharing investments.

Developments in Crypto-currencies

Recent literature on CCs and CBDCs has been extensive, but insightful analysis on the impact of CBDCs on commercial (retail) banking, in particular, has been relatively limited. Nonetheless, Danezis et al (2016) from University College London (UCL) in conjunction with the BoE developed "the first cryptocurrency framework, RSCoin, that provides the control over monetary policy that entities such as central banks expect to retain. By constructing a blockchain-based approach that makes relatively minimal alterations to the design of successful cryptocurrencies such as Bitcoin, we have demonstrated that this centralization can be achieved while still maintaining the transparency guarantees that have made (fully) decentralized cryptocurrencies so attractive" (Danezis et al., 2016, p.12).

The research by Danezis et al (2016) with the RSCoin caught the attention of the national media, with the *Daily Telegraph* articulating that the RSCoin "could pose a devastating threat to large tranches of the financial industry, and profoundly change the management of monetary policy" (Evans-Pritchard, 2016). Indeed, Othman et al (2022) stated that "blockchain technology is decentralized digital ledgers that facilitate secure transactions through peer-to-peer (P2P) ledger process, it is believed that blockchain technology is more efficient and secure than traditional methods of payment" (Othman et al., 2022).

From an Islamic perspective, Alzubaidi et al (2017) explored "the potential and capability of introducing a digital currency that fulfills the Islamic law (*Shari'ah*) functions of money and provides a more stable currency than fiat money" (Alzubaidi et al., 2017, p.79), and found that despite the blockchain technology, CCs would require more stability to become a trusted medium of exchange. Meanwhile, Abdullah et al. (2018), "provides a framework for the development of a new national crypto-currency, which retains its' store of value in terms of monetary performance and price stability" (Abdullah, 2018, p.14), articulating that CCs should be backed by gold or silver, a view that was also echoed by Ajouz et al. (2020).

A study by Othman et al. (2019) articulated that CCs should be considered as high-quality liquid asset (HQLA) under the definitions of Basel III "liquidity risk management (LRM) for the purpose of developing a more resilient banking sector" (Othman et al., 2019, p.109). In a subsequent analysis, Othman et al. (2020), "indicated that cryptocurrency and gold standard monetary systems contributed significantly to reducing global inequality of income and wealth distribution. Conversely, the traditional fiat money system contributes positively to global income and wealth inequality while also contributing significantly to their fluctuation" (Othman et al., 2020, p.1161).

However, the BIS in their *Annual Economic Report* (Jun. 2022), pointed out the "fragmentation of the crypto universe raises serious questions as to the suitability of crypto as money. Money is a coordination device that serves society through its strong network effects. The more users flock to a particular form of money, the more users it attracts… the more users flock to one blockchain system, the worse is the congestion and the higher are the transaction fees, opening the door to the entry of newer rivals who may cut corners on security in favour of higher capacity. So, rather than the familiar monetary narrative of the more the merrier, crypto displays the property of the more the sorrier. It is this tendency toward fragmentation that is perhaps crypto's greatest flaw as the basis for a monetary system" (BIS, 2022, pp. 78-79).

Indeed, the BIS dedicated a full chapter in its *Annual Economic Report* (BIS, 2022), which provided its vision of the future global monetary system. CoinDesk observed that, "In that vision, there is room for only some of crypto's underlying technical features, like programmability and tokenization, not for cryptocurrencies themselves" (Handgama, 2022), and in its *Annual Economic Report* press conference, the BIS claimed, "Anything that crypto can do, CBDCs can do better" (Handagama, 2022). And yet in the context of the separation of the public issuance of a new CBDC, and private finance without the ability to create money, what would happen to retail commercial banks if monetary authorities issue retail CBDCs? Would they continue to operate as commercial retain banks, or have to transform into investment institutions?

Methodology

This study involves library research by "identifying and locating sources that provide factual information or expert opinion" (George, 2008, p.6). Secondary data was selected from material published online by the Bank of International Settlements (BIS),

the International Monetary Fund (IMF), individual central banks such as the Bank of England (BoE) and the Central Bank of Malaysia (BNM), as well as from relevant online newspapers, magazines, journal articles and books. This study directly "located, identified and interpreted the data" (George, 2008). The material was identified and listed in the references and contains text that was selected without intervention involving content analysis. Moreover, this study yields "excerpts, quotations and selected passages, that required discovery, selection, appraisal and clarification" (Labuschagne, 2003) that was selected and not collected. Furthermore, document analysis involves a "systematic procedure for reviewing or evaluating documents including both printed and electronic material" (Bowen, 2009). It requires that the material be "examined and interpreted to gain meaning and understanding, in order to develop empirical knowledge" (Corbin & Strauss, 2008).

Findings and Discussion

In this first part of this section, it is necessary to clearly examine the legal nature of a deposit and why it appears on the liability side of a commercial banks' balance sheet. This implies that a bank deposit is not a 'bailment' or a trust (*amanah*) contract, but rather it is a loan (*qard*) from the depositor to the bank. An Islamic bank in the Middle East would confirm that this is the case for the underlying contract is an interest-free loan (*qard al-hassan*). This clarifies the meaning of a deposit for banks, and does not entirely exonerate the Islamic bank, since the return on the Islamic deposit is deemed a gift (*hibah*) in terms of legal form (*fiqh*), but in terms of economic substance (*iqtisad*) the *hibah* is calculated exactly in the same way as a conventional deposit with regard to compound interest and the TVM. By carefully analyzing the contents of published central bank material concerning the nature of the money supply process in a modern economy, and given central bank admission, it is evident that commercial banks themselves are creating money from lending. Thus, in the second part of this section, in analyzing the development of published material concerning CBDCs, retail CBDCs will clearly prevent money creation since CBDCs can only be issued by central banks and not created by commercial banks. This explains why central banks are reticent in their roll-out of retail CBDCs, even if the intention by monetary authorities is to develop a two-tier monetary and financial system that supposes a CBDC would nominally replace its fiat currency, without any structural change to mechanics of commercial retail banking.

Banking and Credit Creation

As in most jurisdictions, such as the U.K., "bank deposits make up the vast majority - 97% of the amount currently in circulation" (McLeay et al., 2014, p.15). According to the historical House of Lords judicial decision, Foley *v* Foley (1848), under banking law, a bank deposit is defined as a loan. A banker does not hold money in a bank account on trust for its customer. Instead, the relationship between the bank and its' customer is that of debtor and creditor. When the customer deposits money in the account it becomes the bank's money, and the banks' obligation to repay an equivalent sum to the customer on demand, hence 'demand deposit'. "Bank deposits are simply a record of how much the bank owes its customers. So, they are a *liability* of the bank, not an *asset* that can be lent out" (McLeay et al., 2014, p.16).

This is a fundamental issue that empirically contradicts the notion that banks are financial intermediaries that accept deposits from the surplus sector of the economy and efficiently lend to the deficit sector, as proposed by Keynes (1936). "A related misconception is that banks can lend out their reserves. Reserves can only be lent between banks, since consumers do not have access to reserves accounts at [central banks]" (McLeay et al., 2014, p.16), which contradicts the fractional reserve theory of baking, as proposed by Marshall (1890). Indeed, the BoE (McLeay et al., 2014) there are two misconceptions about money creation in a modern economy and they relate to the financial intermediation theory of banking and the fractional reserve theory of banking (and the money multiplier). "The vast majority of money held by the public takes the form of bank deposits. But where the stock of bank deposits comes from is often misunderstood" (McLeay et al., 2014, p.15):

"One common misconception is that banks act simply as intermediaries, lending out the deposits that savers place with them. In this view deposits are typically 'created' by the saving decisions of households, and banks then 'lend out' those existing deposits to borrowers…Saving does not by itself increase the deposits or 'funds available' for banks to lend. Indeed, viewing banks simply as intermediaries ignores the fact that, in reality in the modern economy, commercial banks are the creators of deposit money" (McLeay et al., 2014, p.15).

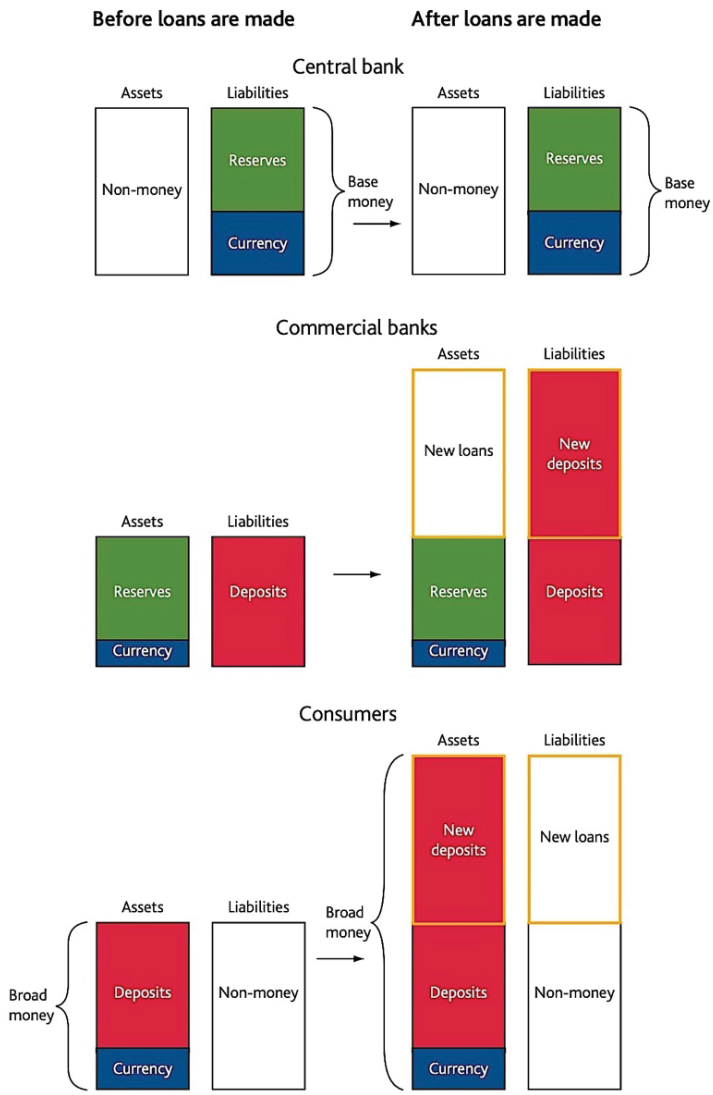
"Another common misconception is that the central bank determines the quantity of loans and deposits in the economy by controlling the quantity of central bank money - the so-called 'money multiplier' approach. In that view, central banks implement monetary policy by choosing a quantity of reserves. And, because there is assumed to be a constant ratio of broad money to base money, these reserves are

then 'multiplied up' to a much greater change in bank loans and deposits. For the theory to hold, the amount of reserves must be a binding constraint on lending, and the central bank must directly determine the amount of reserves. While the money multiplier theory can be a useful way of introducing money and banking in economic textbooks, it is not an accurate description of how money is created in reality. Rather than controlling the quantity of reserves, central banks today typically implement monetary policy by setting the price of reserves - that is, interest rates. In reality, neither are reserves a binding constraint on lending, nor does the central bank fix the amount of reserves that are available. As with the relationship between deposits and loans, the relationship between reserves and loans typically operates in the reverse way to that described in some economics textbooks. Banks first decide how much to lend depending on the profitable lending opportunities available to them - which will, crucially, depend on the interest rate set by the Bank of England. It is these lending decisions that determine how many bank deposits are created by the banking system. The amount of bank deposits in turn influences how much central bank money banks want to hold in reserve (to meet withdrawals by the public, make payments to other banks, or meet regulatory liquidity requirements), which is then, in normal times, supplied on demand by the Bank of England" (McLeay et al., 2014, p.15).

Therefore, in reality central banks, such as the BoE, are fully aware that banks are not intermediaries and neither do they multiply up money supply as fractional reserve institutions (McLeay et al., 2014). In a modern economy, bank deposits are created from lending by commercial banks themselves. When a customer takes out either a conventional or an Islamic mortgage, it credits the customers' bank deposit with the amount of the financing. At that point new money is created. Historically, therefore, Tobin (1963) referred to deposits as "fountain pen money, money created by the stroke of the bank president's pen when he approves a loan and credits the proceeds to the borrower's checking account" (Tobin, 1963, p.1). Additionally, following his empirical research, Werner (2014) also stated that, "money supply is created as fairy dust produced by the banks individually, out of thin air" (Werner, 2014, p.1). This process is reflected in Figure 1, which explains how lending by the banking sector effects the balance sheet of the central banks, commercial banks and consumers.

Figure 1

Money Creation by the Aggregate Banking Sector When Making New Loans



Source: McLeay et al. (2014, p.16)

In the middle row, both sides of the commercial banks' balance sheet increase as new loans and deposits are created, with new deposits as a liability (not an asset) of the banks. In the bottom row, "the new deposits increase the assets of the consumer (households and firms) and the new lending increases their liabilities"

(Mcleay et al., 2014, p. 16). While new deposits (new broad money) have been created as an asset on the consumer's balance sheet, the top row shows that this is done "without any change in central bank money or base money" (McLeay et al., 2014, p.16). Higher levels of deposits may require banks "to hold more base money to meet withdrawals by the public or make payments to other banks. And reserves are supplied…on demand by the Bank of England to commercial banks in exchange for other assets on their balance sheets. In no way does the aggregate quantity of reserves directly constrains the amount of bank lending or deposit creation" (McLeay et al., 2014, p.16).

However, there are constraints on this process. Firstly, banks themselves are constrained and have to "lend profitably in a competitive market" whilst mitigating their credit and liquidity risks in making additional loans. As such, regulatory policy and prudential regulation, involving banks' capital and liquidity positions, act as a constraint "to mitigate a build-up of risks that could pose a threat to stability of the financial system" Secondly, money creation is constrained by the behaviour of consumers, and as mentioned earlier, households and firms can destroy credit (deposits) by repaying outstanding loans, although they can spend it into the economy with potential implications for inflation. Thirdly, "The ultimate constraint on money creation is monetary policy. By influencing the level of interest rates in the economy [monetary policy] affects how much households and companies want to borrow". "This occurs both directly, through influencing loan rates charged by banks, but also indirectly through the overall effect of monetary policy on economic activity…consistent with its objective of low and stable inflation". It should be emphasized that, central banks such as the BoE, have not been successful at achieving price stability under the fiat standard (Abdullah, 2021). The rates of interest that banks obtain from reserves placed at the central bank influences the rates at which they are willing to lend in money markets. "Changes in interbank interest rates then feed through to wider rates of interest in different markets and maturities, including interest rates that banks charge borrowers for loans and offer savers for deposits. By influencing the price of credit in this way, monetary policy affects the creation of broad money" (Mcleay et al., 2014, p. 21).

This differs from the conventional text-book view that, "central banks determine the quantity of broad money via a money multiplier by actively varying the quantity of reserves. In that view, central banks implement monetary policy by choosing the quantity of reserves". This assumes "a stable ratio of broad money to base money, so that reserves are then multiplied up to a much greater change in

bank deposits as banks increase lending and deposits". This reflects the fractional reserve theory of banking and the money multiplier as proposed by Marshall (1890). However, in the view of the BoE, "Neither step in that story represents an accurate description of the relationship between money and monetary policy in the modern economy. Central banks do not typically choose a quantity of reserves to bring about the desired short-term interest rate. Rather, they focus on prices - setting interest rates. [Central banks] controls interest rates by remunerating reserves at its chosen policy rate" (McLeay et al., 2014, p.21).

The supply of base money (reserves and currency) "is determined by banks' demand for reserves both for the settlement of payments and to meet demand for currency from their customers". The demand for base money is "a consequence rather than a cause of banks making loans and creating broad money [supply]. This is because banks' decisions to extend credit are based on the availability of profitable lending opportunities at any point in time" (McLeay et al., 2014, p.21). A bank' profitability, as a function of the spread on loan and deposit rates of interest, depends on a number of factors, including a banks' cost of funds, which is closely related to the interest rate paid on reserves, which is the policy rate. As mentioned earlier, the underlying model of commercial banking reflects the general view of the credit creation theory of banking (Macleod,1894), and specifically, the first Governor of the BoE, William Patterson, on obtaining the charter of the BoE in 1694, that, "the Bank has benefit of interest on all money which it creates out of nothing" (Quigley, 1966, p.49). Money creation affects the economy in terms of the boom and bust of the credit cycle and the financial crises that follow the implosion of asset bubbles (Abdullah, 2018).

Crypto-Currencies and the Development of CBDCs

On 31st October 2008, publishing under the pseudonym of Satoshi Nakamoto, a computer programmer announced he had designed "a purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution" (Nakamoto, 2008), and thus Bitcoin (BTC) became a reality. On 22nd May 2010, someone paid 10,000 BTCs to buy two pizza pies worth USD 25.00, implying that a BTC not only had a positive valuation, but was being used a medium of exchange (Ammous, 2018). Thus, if USD 5.00 worth of BTCs was bought in 2010 for USD 0.0025/BTC, i.e. 2,000 BTCs, then in Dec. 2017 such an investment was worth USD 36 million at USD 18,000/

BTC, and despite the volatility, as of end July 2022, it is still worth USD 45 million at USD 22,500/BTC.

Figure 2

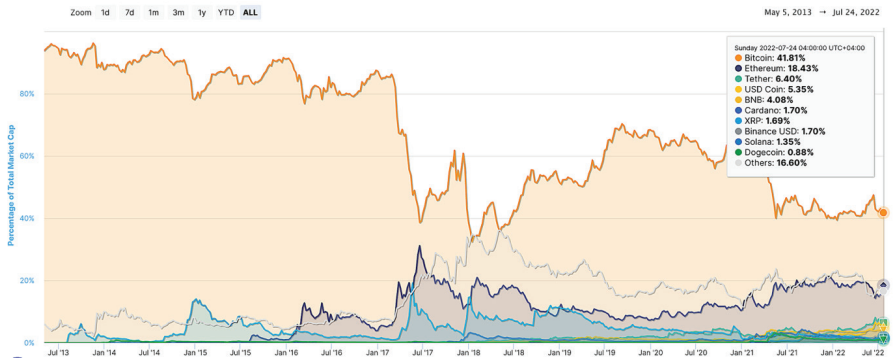
The Bitcoin to USD Exchange Rate

Source: Coinmarketcap (2022a)

The rate of exchange between one BTC and the USD is reflected in Figure 2 from 2013-2022, and by 10th Nov. 2021, the price of a BTC hit an all-time high of USD 69,000/BTC. A BTC could be regarded as a medium of exchange, a decentralized peer-to-peer (P2P) payment system and also as a digital asset, that was nonetheless very volatile and experienced significant capital gains or losses. As of 23 July 2022, there are 20,323 different crypto-currencies and 499 crypto exchanges: "the global crypto market capitalization is USD 1.04 trillion and the total crypto market daily volume is USD 71.4 billion" (Coinmarketcap, 2022b). Furthermore, "the total volume in DeFi is currently USD 6.13 billion, 8.58% of the total crypto market 24-hour volume. The volume of all stablecoins is now USD 64.90 billion, which is 90.91% of the total crypto market 24-hour volume" (Coinmarketcap, 2022b). BTC still remains the dominate crypto-asset with about 41.8% market-share of total global market capitalization (Figure 3).

Figure 3

Major Crypto Assets by Percentage of Total Market Capitalization



Source: Coinmarketcap (2022b)

The technology surrounding digital assets, decentralized crypto-currencies and de-centralized finance (DeFi), including blockchain, artificial intelligence, big data, machine learning and algorithms are developing exponentially. However, there remains strong diverse views as to whether BTC and the other crypto-currencies (CCs) are operating in the public interest or are even deemed *Sharīʿah*-compliant. Generally, different jurisdictions define CCs as a medium of exchange or as an asset, although the latter has tax implications on any capital gains. Furthermore, when CCs first emerged, given that they were operating outside of the regulated monetary and financial eco-system, caused central banks to be initially wary. In 2016, members of BNM's legal department published a paper on *Regulation of Virtual Currencies* in which they acknowledged that, "Bitcoin's decentralized payment system and finite supply could make central banks obsolete" (Zahudi & Amir, 2016, pp.65-66).

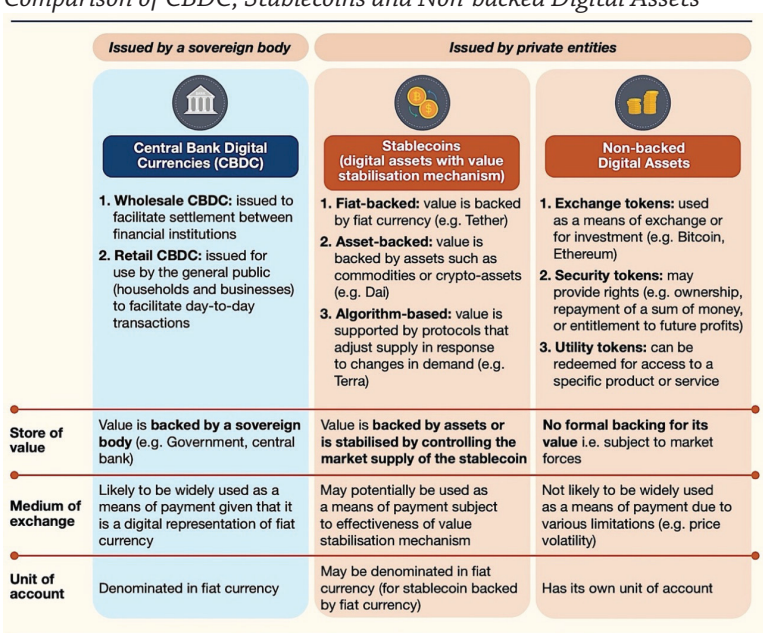
However, by 2022, the Managing Director of the International Monetary Fund (IMF), Kristalina Georgieva, in a speech entitled *The Future of Money: Gearing up for Central Bank Digital Currency*, stated that, "All told, around **100 countries** are exploring CBDCs at one level or another. Some researching, some testing, and a few already distributing CBDC to the public. In the **Bahamas**, the *Sand Dollar* - the local CBDC - has been in circulation for more than a year. **Sweden's** *Riksbank* has developed a proof of concept and is exploring the technology and policy implications of CBDC. In **China**, the digital renminbi [called e-CNY,] continues to progress with **more than a hundred million** individual users and **billions of yuan** in transactions. And, just last month, the **Federal Reserve** issued a report that noted that *a CBDC could fundamentally change the structure of the U.S. financial sys-*

tem" (Georgieva, 2022). In fact, the full quote from the U.S. Federal Reserve report stated, "A CBDC could fundamentally change the structure of the U.S. financial system, altering the roles and responsibilities of the private sector and the central bank" (Federal Reserve, 2022, p.17). It is this aspect, concerning changes in the financial system, that has stalled the widespread adoption of central bank digital currencies (CBDCs). Accordingly, central banks "are increasingly pondering whether to issue their own digital currencies to the general public, so-called retail central bank digital currency (CBDC)" (IMF, 2022), rather preferring initially, to examine a roll-out of CBDCs to improve the efficiency of wholesale interbank payments, before addressing retail or general purpose CBDCs (BIS, 2021).

As the Central Bank of Malaysia (BNM) also observed (Figure 4), crypto-currencies are rapidly evolving, including tokenization and distributed ledger technology (DLT) to facilitate peer-to-peer (P2P) transfers "without the need for intermediaries…[which] can spur greater efficiency, inclusion, and vibrancy in the payments and financial landscape. Increased competition in the retail payment space may result in lower cost, wider access, and better services" (BNM, 2022, p.84).

Figure 4

Comparison of CBDC, Stablecoins and Non-backed Digital Assets

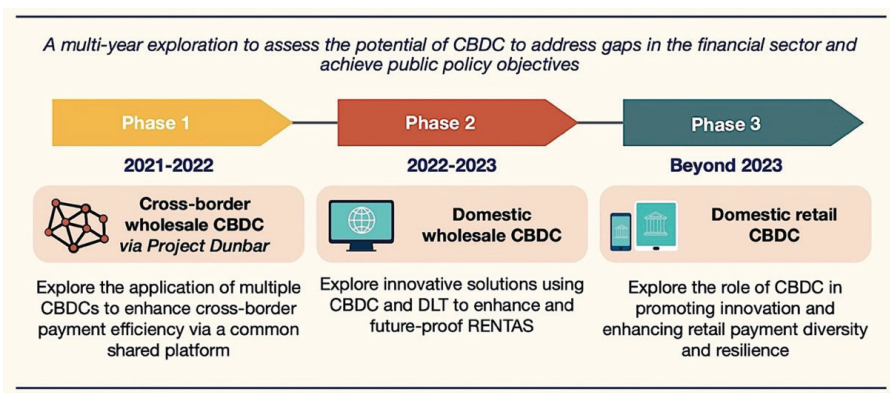


Source: BNM (2022, p.84)

As Bank Negara Malaysia has pointed out, "Applications of emerging technologies – such as CBDC, stablecoins, and the broader DLT infrastructure – may also help address longstanding pain points, particularly those in cross-border payments (e.g. high costs, low speed, limited access, and insufficient transparency). CBDC in particular can also serve as a tool to achieve public policy goals, including by advancing financial inclusion, strengthening monetary policy transmission as well as promoting innovation in payment services. Leveraging its programmable features, CBDC may also spur other innovations in the way financial transactions are conducted through the use of smart contracts." (BNM, 2022, pp.84-85). To this end, BNM has begun an extensive exploration of CBDC adoption, via a proof-of-concept (POC) roadmap involving three phases (Figure 5), comprising a cross-border wholesale CBDC, a domestic wholesale CBDC and a domestic retail CBDC.

Figure 5

Malaysia's CBDC Proof-of-Concept Roadmap



Source: BNM (2022, p.86)

Phase 1 (Cross-border wholesale CBDC): seeks to address "frictions in cross-border payment arrangements such as low speed, high cost, limited access, and insufficient transparency…Instant settlement has the potential to reduce the number of intermediaries, and to ensure faster and cheaper cross-border payments…[Malaysia], as a highly open economy with trade-to-GDP ratio averaging over 130% since 20104, any improvement in the efficiency of cross-border payments has the potential to create substantial cost savings and productivity gains, thereby strengthening Malaysia's trade competitiveness…[BNM] has collaborated with the BIS Innovation Hub, Reserve Bank of Australia, Monetary Authority of Singapore, and

South African Reserve Bank to test the use of wholesale CBDCs for international settlements via a shared platform through Project Dunbar" (BNM, 2022, p.86), as reflected in Figure 6.

Figure 6

Overview of Project Dunbar

Source: BNM (2022, p.86)

Phase 2 (Domestic wholesale CBDC): a wholesale CBDC allows countries like Malaysia to re-design their domestic wholesale payment system, Real-Time Electronic Transfer of Funds and Securities System (RENTAS), to reduce "the single point of failure risk, enhance the efficiency of liquidity management, simplifying compliance processes, and enabling new applications, such as the settlement of tokenized assets" (BNM, 2022, p.86).

Phase 3 (Domestic retail CBDC): Although Malaysia has an efficient real-time retail payment system, the Real-time Retail Payments Platform (RPP), it is expected that a retail CBDC would encourage "greater innovation in the financial sector… By designing it with public interests in mind, an open and flexible CBDC platform may serve as a shared infrastructure upon which private sector innovation may flourish. For instance, a CBDC can be programmed to streamline compliance processes and facilitate automatic payment to beneficiaries upon meeting certain pre-defined compliance processes. Some examples include automated coupon payment upon bond maturity, automatic routing of tax payments to the authorities at point of sale and automated settlement of vehicle or real estate purchase upon confirmation of the transfer of title. Besides lowering transactions costs, this has

the potential to mitigate counterparty risk and thereby enhance financial stability" (BNM, 2022, p.86).

The development of "CBDC, stablecoins and other digital assets, may present challenges and risks" (BNM, 2022, p.87) to monetary and financial stability that requires an assessment of "monetary policy transmission, financial intermediation, capital flow management, and financial integrity; development of an effective surveillance framework; and strengthening regulatory and supervisory frameworks to mitigate risks without stifling innovation. This may include developing the appropriate regulatory approach to stablecoins and establishing the prudential treatment of digital assets in the financial sector" (BNM, 2022, p.87).

Furthermore, given the fragmentation of CCs, even algorithmic stablecoins may not be so stable after all: "Despite their name, stablecoins - in particular, algorithmic ones - are less stable than their issuers claim. In May 2022, TerraUSD entered a death spiral, as its value dropped from USD 1.00 to just a few cents over the course of a few days… The implosion of TerraUSD (UST) highlights inherent fragilities in some versions of stablecoins. The use of UST grew rapidly over 2021-22 so that, prior to its collapse, it was the third largest stablecoin, with a peak market capitalisation of USD 18.7 billion. An algorithmic stablecoin, it maintained value by adjusting supply in an automated arbitrage trading strategy with another cryptocurrency, Luna, on the Terra blockchain. UST aimed to keep a one-for-one peg to the US dollar by being convertible into one dollar's worth of Luna, and vice versa… Once investors lost confidence in the sustainability of the system, the arrangement unraveled. In May 2022, the value of UST plummeted to almost zero" (BIS, 2022, pp.81-82). The BIS concluded that, "Fundamentally, crypto and stablecoins lead to a fragmented and fragile monetary system. Importantly, these flaws derive from the underlying economics of incentives, not from technological constraints. And, no less significantly, these flaws would persist even if regulation and oversight were to address the financial instability problems and risk of loss implicit in crypto" (BIS, 2022, p.89).

Indeed, the BoE essentially confirmed that, "The composition of stablecoin backing assets may in some cases not be sufficient to cope with mass redemptions, which could create risks for the wider financial system" (BoE, 2022), and yet this is reasonable definition of a bank-run. Indeed, the financial instability of the fiat standard can also be called into question. "According to IMF data, between 1970 and 2010 no less than 145 countries have lived through a major banking crisis, 208 through monetary

crashes, and another 72 have experienced a sovereign-debt crisis…This represents a total of 425 systemic crises, an average of more than 10 countries getting in trouble each year! These crises have hit more than three-quarters of the 180 IMF member countries, many of whom have, therefore, experienced them several times" (Lietaer, 2017, p.48), "and despite this financial instability, regulatory requirements, which assume that banks are financial intermediaries, have failed to stop a single financial crisis" (Abdullah, 2021, p.77). This confirms that central banks, themselves, have not been successful at achieving financial stability.

Conclusion

This study has demonstrated that central banks have become monetary reformers in the context of CBDCs and believe they can operate them better than private CCs given the views of the BIS (Jun. 2022), the IMF (2022), the BoE (2022) and BNM (2022). As such, monetary authorities, are likely to regulate crypto-exchanges and crypto-assets, adopt crypto technology in the development of their own CBDCs, if not eventually nationalizing crypto-currencies altogether.

However, as per the extensive document analysis derived from the admission by the BoE's own monetary analysis directorate (McLeay et al., 2014), deposits are not the source of loanable funds, but rather individual banks are engaged in creating money from lending. Indeed, given the accounting nature of credit creation, this was further empirically established by Werner (2014) for conventional banks and Abdullah (2021) for Islamic banks. However, Werner (2014) thinks credit creation could still be retained if credit is directed towards productive financing, thereby increasing GDP, whereas Abdullah (2021) thinks commercial banks will never accept credit control as a function of monetary policy.

Furthermore, the public issuance of CBDCs would remove money creation from private banks, since CBDCs "represent a direct liability of the central bank" (BNM, 2022, p.84). Indeed, regarding the impact of CBDCs on seigniorage, if CBDCs emerge as a new national currency, then seigniorage will "move from commercial banks to the central bank" (BIS, 2018, p.26). Accordingly, CBDCs would have to separate the public issuance of money and the private issuance of finance, whereas under the fiat standard, private banks combine both functions.

With the full introduction of retail CBDCs, commercial banks, which currently create the vast majority of fiat money, would have to become 100% reserve institutions. They would have to adopt risk-bearing equity finance and profit-and-

loss sharing investment products, rather than money creation and risk-free debt finance priced at the TVM. In reality, commercial banks will have to transform into genuine investment, or wealth management intermediaries (Abdullah & Nor, 2018).

Ultimately, CBDCs will also have to return to intrinsic value, if they are not to repeat the instability of fiat money, or even private CCs and stablecoins, and inevitably should be backed by real assets. More likely they will have to be 100% backed by gold and/or silver, since empirical analysis over 1,400 years has confirmed that prices expressed in gold and silver are low and stable over the long term (Abdullah, 2021), it could be argued that monetary policy should target a high value currency in order to maintain low and stable prices, as early Islamic scholarship had envisaged (Abdullah, 2022).

Certainly, monetary reform is inevitable, since the prevailing monetary and financial system is unsustainable. According to the Institute of International Finance (IIF) and IMF data, at the end of 2021, global debt was USD 303 trillion (IIF, 2022) and global GDP was USD 96.3 trillion (IMF, 2022), which corresponds to a global debt to GDP ratio of 315%. Our debt-based monetary system is manufacturing debt at a faster rate than what mankind can produce. At the start of the last global financial crisis in late 2007, Greece also had a debt to GDP ratio of about 315% (BIS, 2022), before it was ultimately bailed out by the IMF and the EU. Accordingly, the macroeconomic trajectory is inexorably leading us to yet another global financial crisis, unless we start to develop a more sustainable monetary system.

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