



Munich Personal RePEc Archive

Central bank digital currency can lead to the collapse of cryptocurrency

Ozili, Peterson K

Central Bank of Nigeria

2021

Online at <https://mpra.ub.uni-muenchen.de/111218/>
MPRA Paper No. 111218, posted 28 Dec 2021 11:33 UTC

Central bank digital currency can lead to the collapse of cryptocurrency

Peterson K. Ozili

Abstract

Cryptocurrencies have become popular. Economic agents use private digital currency, such as bitcoins and other cryptocurrencies, to make payments and it pose a threat to fiat paper currency. Central banks have begun to respond to this threat. They realize that they need to join the race to offer a digital currency and dominate the digital currency landscape which can lead to the collapse of most private digital currencies that are not issued by a central bank or a monetary authority. In this paper, I show how the issuance of a central bank digital currency can lead to the collapse of private digital currencies such as bitcoin. I argue that central banks will leverage on their monetary powers, and the trust that citizens have in government-backed money. This may give central banks strong incentives to issue a central bank digital currency. The issuance of a central bank digital currency can erode trust in cryptocurrencies, and lead to lack of trust in cryptocurrency, thereby leading to the collapse of cryptocurrencies although not immediately.

Keywords: central bank digital currency, cryptocurrency, bitcoin, blockchain, distributed ledger, payment system, central banks, CBDC, digital innovation, cryptoassets, stablecoin, Covid-19, fiat digital currency.

JEL classification: E42, E58, G21, G28, O33.

1. Introduction

Cryptocurrencies are famous for its volatility and anonymity. A cryptocurrency is a type of digital money that enables individuals to transmit value in a digital environment aided by blockchain technology. It is decentralized and cannot be controlled by a central authority (Bunjaku et al, 2017; Ozili, 2019). Cryptocurrencies run on distributed-ledger technology, meaning that multiple individuals connected by digital devices all over the world are constantly verifying the accuracy of cryptocurrency transactions.

Cryptocurrencies are considered to be highly volatile (Yi et al, 2018; McCoy and Rahimi, 2020). For this reason, cryptocurrencies are not trusted to be used as money, and economic theory supports this assertion. In economic theory, one characteristic of money is that it should not be volatile (Alchian, 1977; Smithin, 2002; Ammous, 2018).

Another type of digital currency is emerging – one that is controlled by a central authority. It is often referred to as a central bank digital currency or fiat digital currency. A central bank digital currency (CBDC) is a fiat currency in electronic form issued by a central bank or a monetary authority. CBDCs are created and controlled by central banks.

2. Risks of cryptocurrencies

Cryptocurrencies are emerging digital currencies that allow anonymity in accessing various risk-taking activities through the Internet (Mills and Nower, 2019). A number of studies document the risk of cryptocurrency. For instance, Shanaev et al (2019) show that majority of the attacks on blockchain leads to a decrease in coin prices, and the coin prices do not recover to pre-attack levels one week after the attack event. Marella et al (2021) argue that whenever these cyber-attacks occur, customers may lose their trust not only on a given cryptocurrency exchange but also in cryptocurrencies in general. Mills and Nower (2019) observe a correlation between trading high-risk stocks and trading cryptocurrencies. They observe that gamblers who engaged in both forms of trading reported greater depression and anxiety symptoms. Zhang et al (2021) investigate whether

investors earn higher profits by holding cryptocurrencies with higher downside risk. They find a positive relationship between downside risk and future returns in the cryptocurrency market. Caporale et al (2021) examine the role of cyber-attacks on volatility spillovers between three cryptocurrencies – Bitcoin, Litecoin and Ethereum. They find a significant dynamic interdependence between the three cryptocurrencies when cyber-attacks are taken into account with Bitcoin being the most dominant cryptocurrency. Caporale et al (2020) find that cyber-attacks lead to high volatility of cryptocurrencies.

3. The rise of Central Bank Digital Currency

Central bank digital currencies have emerged in response to the growing cashlessness of many societies and the embrace of cryptocurrencies which have no legal backing. Many central banks are taking deliberate steps to develop their own central bank digital currency (CBDC). A 2021 Bank of International Settlement (BIS) survey of central banks confirm that 86% are actively researching the potential for CBDCs, 60% are experimenting with the technology and 14% are deploying pilot projects on CBDCs.

Some central banks have reached an advanced stage in developing a CBDC such as China, Sweden and the Bahamas, while other central Banks are still at the early stages of developing a CBDC such as Canada, United States, Thailand, Singapore, Venezuela, and Uruguay. Also, some central banks are adopting blockchain technology and cryptography to create their own CBDC while others are adopting other technologies.

4. Central Bank Digital Currency: A Literature Review

The literature show that the financial services industry has been disrupted by the launch of private digital currencies such as Bitcoin, and central banks want to take advantage of these new technologies to help deliver their core functions by issuing a central bank digital currency (Wadsworth, 2018; Ozili, 2021). Bjerg (2017) show that, under certain circumstances, the decision to adopt a CBDC monetary system might be a crucial political decision.

Regarding enhancing central bank function, Fernández-Villaverde et al (2020) show that the introduction of central bank digital currency presents an impossible central bank digital currency trilemma for central banks which are the goals of efficiency, financial stability (i.e., absence of runs), and price stability; meanwhile, central banks can only achieve at most two of the goals at the same time. Boar et al (2020) show that even though central banks plan to issue a central bank digital currency, they will need to collaborate with other central banks to better understand the impact of private digital tokens for central bank digital currency payments. Barontini and Holden (2019) show that, while most central banks are conducting research into central bank digital currency, only a limited number of central banks are at the pilot stage with central bank digital currencies, and even fewer central banks see the issuance of a central bank digital currency as a short or medium term goal. Engert and Fung (2017) show that some of the motivations for central bank digital currency are not compelling enough, for instance, the desire to issue a central bank digital currency to promote financial inclusion may not be an important consideration in developed countries even though it may be an important consideration for issuing a central bank digital currency in emerging and developing economies. Also, issuing central bank digital currencies in order to increase the contestability in retail payments may not be a very valid reason to issue central bank digital currency because such impact depends on the specific attributes of the central bank digital currency. Bordo and Levin (2017) investigate how a central bank digital currency could facilitate the transparent conduct of monetary policy. They show that central bank digital currency can become a costless medium of exchange, a secure store of value, and a stable unit of account only if central bank digital currencies are account-based and interest-bearing. Cukierman (2019) argue that, for central banks to preserve the effectiveness of monetary policy in a world that is increasingly flooded by private digital currencies, central banks will have no choice but to issue their own digital currencies.

Regarding the design of central bank digital currency, Bossu et al (2020) investigate the capability of a central bank digital currency to acquire the status of official means of payment. They state that token-based central bank digital currency and account-based central bank digital currency are two

concepts that are different forms of money, and the legal treatment of the two types of central bank digital currency will depend on the design features of the central bank digital currency. They show that central bank digital currency is a central bank liability incorporated in a digital token and transferred to users. Lee et al (2021) show that central banks that are adopting central bank digital currencies will have to choose the choice of the ledger. They will determine whether the central bank digital currency should be based on distributed ledger technology or the traditional central bank infrastructure. Lee et al (2021) also show that countries that are conversant with the distributed ledger technology will have a competitive advantage in developing a central bank digital currency. They show that, after implementing the central bank digital currency, there will be a need to continuously review existing regulations to support central bank digital currency, and there may be a need to modify central bank digital currency whenever international dynamics change the central bank digital currency landscape. Auer et al (2020) show that more central banks are issuing retail central bank digital currency architectures in which the central bank digital currency is a direct cash-like claim on the central bank.

Regarding the welfare effects of a central bank digital currency, Davoodalhosseini (2021), in a Canadian case study, examine a monetary policy design where only cash, only central bank digital currency, or both cash and central bank digital currency are available to economic agents. They show that if the cost of using central bank digital currency is not too high, economic agents will prefer to use central bank digital currencies than cash. Also, having both cash and central bank digital currency available could lead to lower welfare than when only cash or only central bank digital currency is available. Auer and Böhme (2020) show that central bank digital currencies can offer cash-like safety and convenience for peer-to-peer payments. Söilen and Benhayoun (2021) use a survey questionnaire to assess the acceptance of central bank digital currencies by households. They show that the adoption of central bank digital currencies by households was due in part by social recommendations.

Regarding the macroeconomic and financial stability benefits of central bank digital currency, Yao (2018) argue that the development of central bank

digital currency in China could make money become a more stable value, and could offer effective tools for macroeconomic control. Williamson (2019) construct a model of multiple means of payment to analyze the effects of the central bank digital currency. They show that central bank digital currency mitigates crime associated with physical currency, and it permits the payment of interest on a key central bank liability. Kim and Kwon (2019) examine the implications of central bank digital currency for financial stability using a monetary general equilibrium model. They show that the introduction of deposits in central bank digital currency account will decrease the supply of private credit by commercial banks, which will raise the nominal interest rate and lower the reserve-to-deposit ratio of commercial banks. This can have a negative effect for financial stability by increasing the likelihood of bank panic in which commercial banks are short of cash reserves to pay out to depositors.

Regarding competition with banks, Chiu et al (2019) point out that if banks have market power in the deposit market, an interest-bearing central bank digital currency can enhance competition, raise the deposit rate, expand intermediation, and increase output. Andolfatto (2021) show that introducing interest-bearing central bank digital currency can increase financial inclusion and diminish the demand for cash. Also, the introduction of interest-bearing central bank digital currency may not disintermediate banks rather it can expand their depositor base if the added competition compels banks to raise interest on customer deposits. Agur et al (2021) examined central bank digital currency in an environment where users are allowed to freely choose between using cash, central bank digital currency, and bank deposits according to their preferences for anonymity and security. They show that a central bank digital currency that competes with deposits could depress bank credit and output. In contrast, a cash-like central bank digital currency may lead to the disappearance of cash over time. Grym et al (2017) states that central bank digital currencies can make banknotes become a technically outdated payment instrument.

Regarding the risks and spillovers of central bank digital currency, Ferrari et al (2020) examine central bank digital currency in an open-economy. They show that the presence of a central bank digital currency can significantly

amplify the global spillovers of shocks. But the magnitude of these effects will depend on the specific design of central bank digital currency, and can be significantly dampened if the central bank digital currency possesses risk-mitigation features.

5. CBDCs can lead to the collapse of cryptocurrency

CBDCs can lead to the death of cryptocurrencies in two ways. One, trust in CBDCs, and two, the power of central banks.

The first reason is trust in CBDCs. CBDCs will become the digital representation of fiat money. Citizens already trust fiat money which means that citizens will very easily trust fiat digital currency when they are issued because it is backed by governments, it is a liability of the central bank, and it is protected by regulation.

The second reason is that central banks have the power to announce that all non-fiat digital currencies are illegal. In most countries, the central bank is empowered by law to be the sole issuer of a legal tender currency. This puts the central bank in a privileged position to issue a new currency, such as a digital currency, when the need arises and to announce that all non-fiat currencies are illegal.

Many central banks have issued strong warnings against the use of cryptocurrencies for economic transactions, while cryptocurrencies have been out-rightly banned in other countries such as Algeria, Bolivia, Morocco, Nepal, Pakistan and Vietnam.

The widespread interest in private digital currencies by economic agents, especially by individuals and businesses, is putting great pressure on central banks to take leadership in the digital currency space. For this reason, it is highly possible that central banks will respond to this pressure by issuing their own fiat digital currency, and thereafter, announce that other non-fiat private digital currencies are illegal for use as a currency in the economy especially bitcoin. Such move by a central bank or government can lead to the death of cryptocurrencies. Central banks that do not want to make cryptocurrencies illegal may permit cryptocurrencies to be used as

investment securities but not as a currency for legitimate economic transactions.

6. Conclusion

In this paper, I discussed the rise of central bank digital currencies (CBDCs) and how cryptocurrencies may not survive as a currency to be used for economic transactions once CBDCs have been issued. The trust that people have in government-backed currency and the power of central banks are two factors that can lead to the collapse of cryptocurrencies as a medium of exchange.

Cryptocurrencies are a recent innovation in the currency space. It emerged with great potential and promise but its high volatility makes it less useful as a currency. Cryptocurrencies can survive the emergence of central bank digital currencies only if it remains an investment asset. But once its promoters insist on it becoming a currency, it will collapse because it cannot compete legally with fiat digital currency or CBDCs.

Reference

- Agur, I., Ari, A., & Dell’Ariccia, G. (2021). Designing central bank digital currencies. *Journal of Monetary Economics*.
- Alchian, A. A. (1977). Why money? *Journal of Money, Credit and Banking*, 9(1), 133-140.
- Andolfatto, D. (2021). Assessing the impact of central bank digital currency on private banks. *The Economic Journal*, 131(634), 525-540.
- Ammous, S. (2018). Can cryptocurrencies fulfil the functions of money? *The Quarterly Review of Economics and Finance*, 70, 38-51.
- Auer, R., & Böhme, R. (2020). The technology of retail central bank digital currency. *BIS Quarterly Review*, March.
- Auer, R. A., Cornelli, G., & Frost, J. (2020). Rise of the central bank digital currencies: drivers, approaches and technologies (No. 8655). CESifo Working Paper.
- Barontini, C., & Holden, H. (2019). Proceeding with caution—a survey on central bank digital currency. *Proceeding with Caution-A Survey on Central Bank Digital Currency* (January 8, 2019). *BIS Paper*, (101).
- Bjerg, O. (2017). Designing new money—the policy trilemma of central bank digital currency.
- Boar, C., Holden, H., & Wadsworth, A. (2020). Impending arrival—a sequel to the survey on central bank digital currency. *BIS paper*, (107).
- Bordo, M. D., & Levin, A. T. (2017). Central bank digital currency and the future of monetary policy (No. w23711). *National Bureau of Economic Research*.
- Bossu, W., Itatani, M., Margulis, C., Rossi, A. D., Weenink, H., & Yoshinaga, A. (2020). Legal aspects of central bank digital currency: Central bank and monetary law considerations. *IMF Working Paper No. 20/254*, Available at SSRN: <https://ssrn.com/abstract=3758088>

Bunjaku, F., Gjorgieva-Trajkovska, O., & Miteva-Kacarski, E. (2017). Cryptocurrencies—advantages and disadvantages. *Journal of Economics*, 2(1), 31-39.

Caporale, G. M., Kang, W. Y., Spagnolo, F., & Spagnolo, N. (2020). Non-linearities, cyber attacks and cryptocurrencies. *Finance Research Letters*, 32, 101297.

Caporale, G. M., Kang, W. Y., Spagnolo, F., & Spagnolo, N. (2021). Cyber-attacks, spillovers and contagion in the cryptocurrency markets. *Journal of International Financial Markets, Institutions and Money*, 101298.

Chiu, J., Davoodalhosseini, S. M., Hua Jiang, J., & Zhu, Y. (2019). Bank market power and central bank digital currency: Theory and quantitative assessment. Available at SSRN 3331135.

Cukierman, A. (2019). Welfare and political economy aspects of a central bank digital currency.

Davoodalhosseini, S. M. (2021). Central bank digital currency and monetary policy. *Journal of Economic Dynamics and Control*, 104150.

Engert, W., & Fung, B. S. C. (2017). Central bank digital currency: Motivations and implications (No. 2017-16). Bank of Canada Staff Discussion Paper.

Fernández-Villaverde, J., Schilling, L., & Uhlig, H. (2020). Central bank digital currency: When price and bank stability collide. CEPR Discussion Paper No. DP15555, Available at SSRN: <https://ssrn.com/abstract=3753955>

Ferrari, M. M., Mehl, A., & Stracca, L. (2020). Central bank digital currency in an open economy. ECB Working Paper No. 20202488, Available at SSRN: <https://ssrn.com/abstract=3733463>

Grym, A., Heikkinen, P., Kauko, K., & Takala, K. (2017). Central bank digital currency.

Kim, Y. S., & Kwon, O. (2019). Central bank digital currency and financial stability. Bank of Korea WP 2019-6, Available at SSRN: <https://ssrn.com/abstract=3330914> or <http://dx.doi.org/10.2139/ssrn.3330914>

Lee, D. K. C., Yan, L., & Wang, Y. (2021). A global perspective on central bank digital currency. *China Economic Journal*, 14(1), 52-66.

Marella, V., Kokabha, M. R., Merikivi, J., & Tuunainen, V. (2021, January). Rebuilding Trust in Cryptocurrency Exchanges after Cyber-attacks. In *HICSS* (pp. 1-10).

McCoy, M., & Rahimi, S. (2020). Prediction of Highly Volatile Cryptocurrency Prices Using Social Media. *International Journal of Computational Intelligence and Applications*, 19(04), 2050025.

Mills, D. J., & Nower, L. (2019). Preliminary findings on cryptocurrency trading among regular gamblers: A new risk for problem gambling? *Addictive behaviors*, 92, 136-140.

Ozili, P. K. (2019). Blockchain finance: Questions regulators ask. In *Disruptive Innovation in Business and Finance in the Digital World*. Emerald Publishing Limited.

Ozili, P. K. (2021). Central bank digital currency in Nigeria: opportunities and risks. Available at SSRN.

Shanaev, S., Shuraeva, A., Vasenin, M., & Kuznetsov, M. (2019). Cryptocurrency value and 51% attacks: evidence from event studies. *The Journal of Alternative Investments*, 22(3), 65-77.

Smithin, J. (Ed.). (2002). *What is money?* Routledge.

Söilen, K. S., & Benhayoun, L. (2021). Household acceptance of central bank digital currency: the role of institutional trust. *International Journal of Bank Marketing*.

Wadsworth, A. (2018). "The pros and cons of issuing a central bank digital currency," *Reserve Bank of New Zealand Bulletin*, Reserve Bank of New Zealand, vol. 81, pages 1-21, June.

Williamson, S. (2019). Central bank digital currency: Welfare and policy implications. Unpublished, University of Western Ontario, 4.

Yao, Q. (2018). A systematic framework to understand central bank digital currency. *Science China Information Sciences*, 61(3), 1-8.

Yi, S., Xu, Z., & Wang, G. J. (2018). Volatility connectedness in the cryptocurrency market: Is Bitcoin a dominant cryptocurrency? *International Review of Financial Analysis*, 60, 98-114.

Yuan, Y., & Wang, F. Y. (2018). Blockchain and cryptocurrencies: Model, techniques, and applications. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 48(9), 1421-1428.

Zhang, W., Li, Y., Xiong, X., & Wang, P. (2021). Downside risk and the cross-section of cryptocurrency returns. *Journal of Banking & Finance*, 133, 106246.