Central bank digital currency: what it can achieve and cannot achieve in Africa

Ozili, Peterson K

2024

Central bank digital currency: what it can achieve and cannot achieve in Africa

Peterson K. Ozili

Abstract

This article presents a discussion on what a central bank digital currency (CBDC) can achieve in African countries and what a central bank digital currency may not achieve in African countries. The study shows that a central bank digital currency can achieve the following. CBDC can become a monetary policy tool; it can reduce the size of the informal economy; it can increase financial inclusion; it can increase digital financial literacy; it can reduce the circulation of counterfeit paper money; it can deepen existing payments system; it can improve social programmes and targeted welfare; it will increase transaction monitoring and surveillance; it can address tax evasion and increase tax revenue in African countries. The study also shows that a central bank digital currency may not completely replace cash in African countries; the issuance and use of CBDC won't make African countries earn a 'developed country' status; CBDC adoption may not stop institutional corruption; CBDC adoption will not stop illicit activities in African countries; and CBDC adoption may not reduce the level of poverty in African countries.

Keywords: central bank digital currency, CBDC, Africa, poverty, financial inclusion, monetary policy, remittance, informal economy, welfare, corruption.

JEL codes: E58, G21 E42, G21, G28.

May 2024

To cite: Ozili, P. K. (2024). Central Bank Digital Currency: What It Can Achieve and Cannot Achieve in Africa. In *Transforming the Financial Landscape With ICTs* (pp. 94-107). IGI Global.

Available at: http://dx.doi.org/10.4018/979-8-3693-1503-3.ch005

1. Introduction

The objective of this article is to discuss what a central bank digital currency (CBDC) can achieve in African countries and what a central bank digital currency may not achieve in African countries.

The rapid rise of private digital currencies or cryptocurrencies, and the widespread adoption of private digital currencies by citizens in African countries, particularly in Nigeria and Kenya, have led African monetary authorities to assess the risks associated with using private digital currencies as a medium of exchange for economic activities. The monetary authorities in many African countries have raised concerns that private digital currencies or cryptocurrencies are too volatile which make them unfit to be used as money, and that cryptocurrencies are often used to hide illegal and criminal activities. The monetary authorities in North African countries, such as Egypt, Morocco, and Algeria, have responded to the threat posed by cryptocurrencies by placing an outright ban on cryptocurrencies. Meanwhile, the central bank in other African countries have either barred regulated financial institutions from facilitating cryptocurrency transactions such as Nigeria or have issued warnings about the risks of cryptocurrencies such as South Africa, Kenya, Uganda, Tanzania, Ghana, Tunisia and Rwanda. Although some African central banks resist cryptocurrency, they have been quite open-minded about the idea of issuing a central bank digital currency. A central bank digital currency is digital money issued by the central bank and is a liability of the issuing central bank (Ward and Rochemont, 2019; Ozili, 2023a).

Monetary authorities in some African countries have begun to research central bank digital currency, and plan to adopt a national central bank digital currency in the future as a counter-reaction to cryptocurrency while harnessing the potential benefits of a central bank digital currency for their economies. Analysts have offered mixed opinions on whether central bank digital currencies will become successful or a total failure (Ozili, 2024a). Some have argued that developed countries, such as Australia, Canada, and the United States, that have a fast, efficient, and reliable payment system infrastructure do not need a central bank digital currency as it will be a duplication of existing wholesale

and retail payment products (Bjerg and Nielsen, 2018). Others have argued that adopting a central bank digital currency can allow central banks to bypass financial intermediaries to reach the people, but the consequence is that the future of financial intermediaries in the financial system may become uncertain (Wang and Gao, 2024). Others have also argued that adopting a central bank digital currency can save money for the government by reducing the cost of printing and managing cash or paper money (Babin et al, 2022). Despite these arguments, many central banks, such as the Reserve Bank of India, Bank of Ghana, the Central Bank of Tanzania, etc., have shown interest in issuing a central bank digital currency so as not to be left behind in the race to issue to a central bank digital currency.

In Africa, many central banks have shown interest in adopting a central bank digital currency (Ozili, 2023b), particularly, Nigeria, South Africa, Ghana, and Senegal. Most central banks in the region are studying central bank digital currency to understand it, to determine the best use case of CBDC, and to determine the design features that meet the payments need of their countries. Policy makers in African countries also want to understand what a CBDC can achieve and what a CBDC may not achieve in African countries. Such understanding is important as it can help to tame the over-optimism that is evident among CBDC enthusiasts in central bank policy circles in African countries.

The discussion in this article contributes to the scant literature on central bank digital currency in African countries. Studies in this literature include Foster et al (2021), Edwards (2021) and Ozili (2022a). Focusing on African countries, this study presents a clear depiction of what a central bank digital currency can achieve in African countries and what a central bank digital currency may not achieve in African countries. Second, this study contributes to the monetary economics literature that examine non-traditional forms of money. Studies in this literature include Wang and Yip (1992), Rochon (1999) and Lucarelli (2011). This study shows that central bank digital currency is an alternative form of money which African countries can use as a medium of exchange and in settlement of debt.

The rest of the article is organized as follows. Section 2 presents the literature review. Section 3 presents the discussion on what a central bank digital currency can achieve in

African countries. Section 4 presents the discussion on what a central bank digital currency may not achieve in African countries. Section 5 concludes.

2. Literature review

There are very few studies on CBDC in developing countries. The reason for this is because CBDC is still a relatively new concept in developing countries. Náñez Alonso et al (2020) show that a reason for issuing a central bank digital currency in developing countries is to expand access to financial services to several geographical locations. Priyadarshini and Kar (2021) suggest that CBDC could offer developing countries a digital safety net and higher financial inclusion. Lee (2020) shows that financial inclusion is a primary motivation for issuing a central bank digital currency in emerging countries, and that for it to achieve success, there needs to be technical advancement in offline adaptability, identity management and traceability. Ozili (2022b) suggests that CBDC can increase financial inclusion by digitizing value chains, improving access to digital financial services, enlarging the digital economy, enhancing the efficiency of digital payments, and offering low transaction cost.

Foster et al (2021) identify the difficulty that may arise when the CBDC of a developing country is tied to foreign reserves. They argue that if a CBDC is pegged to a foreign currency, it could increase asymmetries in the international monetary system by reducing monetary policy autonomy in foreign economies. For instance, if a foreign government's CBDC is available in developing economies that have better control of monetary policy, but higher inflation, it is likely that the foreign government's CBDC could gradually substitute the local currency and have a negative impact on developing countries (Foster et al, 2021). In short, the developing economies' central banks would lose control of money supply because of gradual currency substitution, impacting sustainable development of that country (Foster et al, 2021).

Laboure (2021a) shows that, compared to CBDC, cryptocurrencies are gaining more attention in developing countries and are greatly benefiting from network effects. This means that the more people use it, the more valuable it becomes. Laboure et al (2021b) shows that the network effect is stronger in developing countries where payment systems

are not efficient, and a significant part of the population do not have broad access to traditional financial services. Camara et al (2018) suggest that developing countries must consider some important factors when adopting a CBDC such as the level of informality, the costs associated with issuing and transporting cash, the penetration of mobile and data networks, the level of digital literacy, the degree of financial exclusion, among others.

Killingland and Dahl (2018) argue that developing countries should not issue a CBDC because they have weak institutions and low financial stability compared to developed countries. They further argue that members of the public may not accept a CBDC as an alternative to cash payments. Oh and Zhang (2020) emphasize that CBDC may not be accepted because households in developing countries value the anonymity in cash transactions and they do not want all their payments to be monitored by the government. In contrast, digital money such as a CBDC is likely to be traceable and subject to government monitoring, and for this reason, households in developing countries will prefer to use cash and are less likely to adopt and use CBDC widely. Oxford Analytica (2021) show that cash still dominates in many nations and CBDC adoption will be slower where people are reluctant to lose the anonymity of cash payments.

Duho et al (2022) explore the opportunities and risks of issuing a central bank digital currency in Ghana. They show that the Ghana e-Cedi can support monetary policy, ensure efficient payments, and increase financial inclusion. They also show that the e-Cedi could disrupt the financial system, reduce the use of physical cash and banking services among the uneducated, and the eCedi may be exposed to risks such as cyber-insecurity, and loss of privacy. Bludnik (2023) also argues that the use of a central bank digital currency in African countries, especially in Nigeria, will be difficult and that the risks associated with central bank digital currencies outweigh the benefits. Ahiabenu (2022) compares the central bank digital currency of Nigeria and Ghana and show that the two central bank digital currencies have more similarities than differences. However, the author notes the differences in central bank digital currency deployment, risk profiles, and plans. The author further notes that both Nigeria and Ghana have not developed legal and regulatory environments for central bank digital currency. Kumah (2024) compares the behaviour of Bitcoin and the fiat currencies of six African countries (i.e., Egyptian

Pound, Cedi, ZAR, Naira, Rupee and Dinar) from 10th August 2015 to 31 December 2022. The author finds that, except for ZAR, Bitcoin is observed to be a viable alternative currency to the African currencies. Ozili (2023b), in a survey, showed that at least 14 African countries are interested in issuing a central bank digital currency, 13 African countries have announced that they are researching central bank digital currency, 4 African countries have reached the pilot test stage of issuing a central bank digital currency while only one African country has formally issued a central bank digital currency. Ozili (2023b) further argued that the reason for the low interest in central bank digital currency in African countries is due to the strong preference for cash payments, lack of a robust payment system, low use of digital payments, central banks' focus on other priorities, fear of failure, lack of government interest in digital currency and concerns about CBDC privacy risk and security threats.

3. What central bank digital currency can achieve in Africa

3.1. Interest-bearing CBDC can become a monetary policy tool

An interest-bearing CBDC is a central bank digital currency that pays interest on CBDC holdings. One important benefit of interest-bearing CBDC is that it can become a very effective monetary policy tool. When there is excess money supply in the economy, the central bank can reduce money supply by increasing the interest paid on CBDC holdings. This will mop-up the excess money in circulation in the commercial banking system and the excess money will flow to the central bank as more people and businesses increase their CBDC holdings and decrease their bank deposit balances (Ozili, 2024b). This will reduce the volume of bank lending, reduce money supply in the commercial banking system and decrease inflation. When there is too little money supply, the central bank can increase money supply by decreasing the interest paid on CBDC holdings. This will lead to CBDC-to-bank deposit migration as more people will convert their CBDC holdings back to cash and keep them as deposit with banks. This will increase bank deposits and lead to increase in money supply in the commercial banking system and increase the volume of bank lending.

3.2. Reduce the size of the informal economy

The informal economy or the black economy is where unregulated and unmonitored economic activities take place. Most financial transactions in the informal economy are cash-based transactions. Widespread CBDC adoption in African countries can reduce the size of the informal economy by reducing the supply of paper money or 'cash' in the hands of informal economic agents. The reduction in the supply of 'cash' would starve the informal economy of the cash it needs to survive. This will compel informal agents to use digital currency or digital payments for their transactions. This will bring informal economic agents and their transactions into the formal sector, thereby, reducing the size of the informal economy.

3.3. CBDC can increase financial inclusion

Financial inclusion is one of the many benefits of issuing a central bank digital currency. Financial inclusion involves bringing unbanked adults into the formal financial sector so that they can have access to basic financial services which they can use to improve their welfare (Ozili, 2021; Ozili, 2018). The adoption of central bank digital currencies can increase financial inclusion in African countries by: (i) improving access to digital financial services, (ii) permitting people to hold CBDC even if they do not own a formal bank account, (iii) designing CBDC to have offline features so that people can perform CBDC transactions without internet connectivity, and (iv) low transactions cost. This suggests that the ability of CBDC to increase financial inclusion in African countries depends on CBDC design. In other words, the CBDC must be designed to have features that promote financial inclusion (Ozili, 2022b).

3.4. CBDC adoption will increase digital financial literacy

Central bank digital currency is one of many digital payment innovations. Just like every other innovation, people who want to use innovative products and services will have to learn how they work and how they can be used to meet their needs (Mallinson, 2021). Similarly, people who want to hold or use central bank digital currency in African countries will have to learn about central bank digital currency and how to hold a central bank digital currency in a wallet or token. They will also learn about how to download and install the

CBDC app on their smart phones, and how to transfer CBDC from one party to another party. They will also learn about how to secure their CBDC account from unauthorized access. This means that the willingness to use central bank digital currency in African countries will drive people to learn more about central bank digital currency, thereby increasing their level of digital financial literacy. Some African citizens will gain basic knowledge about central bank digital currency. Other African citizens who are not contented with basic knowledge about central bank digital currency will seek to gain a deeper knowledge of central bank digital currency including digital money management skills and cybersecurity risk mitigation skills. Therefore, it is fair to say that central bank digital currency is a good thing because it can motivate people to become digital financial literate especially people who are willing to use CBDC. When this happens, it can increase the level of digital financial literacy in African countries and for the African continent.

3.5. CBDC can stop the circulation of counterfeit paper money

Much of the counterfeit paper money circulating in some African countries can be found in the informal sector where unregulated and illegal economic activities take place. Widespread usage of central bank digital currency in African countries can help to reduce the circulation of counterfeit paper money. Adopting central bank digital currency can make African central banks reduce the stock of printed paper money. The reduction in the stock of printed paper money will make paper money become limited in supply and it will reduce the opportunities to counterfeit paper money. This is because counterfeit paper money will become easy to detect when paper money becomes very limited in supply. On the other hand, central bank digital currency will be difficult to counterfeit because of its unique design features. Therefore, it is possible that the widespread adoption of central bank digital currency can reduce the circulation of counterfeit paper money.

3.6. CBDC adoption can deepen existing payments system

The adoption of CBDC can improve and deepen the existing payments system by upgrading the entire digital payments infrastructure, introducing new payments technology, the emergence of new Fintech players and payment system providers and introducing new products and services. The adoption of CBDC will, over time, facilitate the digitization of value chains in the economy. It will give businesses access to unlimited wholesale CBDC and encourage businesses to bring their activities into the digital financial system, thereby, enlarging the digital economy. CBDC can also lead to improved access to digital financial services and greater efficiency of digital payments.

3.7. CBDC can improve social programmes and targeted welfare

A CBDC in an African country can be used to fund social programmes to ensure that the basic needs of citizens are met. For example, CBDC can be used to fund local social programmes, state social programmes and federal social programmes such as health insurance, food assistance, housing subsidies, energy and utilities subsidies, and education and childcare assistance. This means that CBDC can play an important role in offering social security to African citizens. Also, CBDC can make it possible for the government to make targeted welfare payments to citizens directly, without needing any intermediary. This will reduce the cost of delivering welfare benefits to citizens in need of welfare support such as cash assistance. The absence of an intermediary means that citizens will receive their welfare disbursement into their CBDC wallet as quickly as possible.

3.8. CBDC adoption will increase transaction monitoring and surveillance

Central bank digital currency will enable African governments to effectively monitor all CBDC-based financial transaction in their countries. CBDC will increase government's monitoring and surveillance of all CBDC financial transactions and allow the government to make timely interventions to reduce frictions in existing payment systems, such as reducing the cost of CBDC transactions, and increasing the speed of CBDC transactions while ensuring finality of payments.

3.9. CBDC can address tax evasion and increase tax revenue

When African countries fully adopt CBDC, 'tax evasion' will become more difficult to carry out since it would become impossible to use common methods, such as offshore banking, to hide financial activity from the central bank or the government. The absence of tax evasion means that the government will not lose tax revenue. Also, full adoption of CBDC in African countries will bring more economic activities into the formal economic system, and make such economic activities eligible to be taxed, thereby increasing the government's tax revenue.

3.10. CBDC can facilitate remittance inflows

A central bank digital currency can facilitate the inflow of remittances to African countries. Remittances into African countries are made through international money transfer operators who charge a fee ranging from 1 percent to 5 percent of the value of the remitted funds. Using CBDC to receive remittances can lower remittance transfer costs and make it easier for Africans working abroad to remit funds to their families back home. This can be done by obtaining central bank digital currency from international money transfer operators and transferring them to recipients in African countries at low-cost. Also, there will be a need to unify any disparity between the official and parallel exchange rates to enhance the incentives for using central bank digital currency to send remittances to African countries.

4. What central bank digital currency may not achieve in Africa

4.1. CBDC may not completely replace cash in African countries

Presently, there is strong preference for cash over digital currency in many African countries particularly in East, West and Central African countries. This means that many people will continue to use cash even after a central bank digital currency is issued in African countries. What is more tenable in the region is that cash is likely to co-exist with central bank digital currency in African countries due to people's strong preference for cash in some African countries. However, a shift from cash to central bank digital currency

in African countries will occur only if central bank digital currency offers more benefits to users than cash.

4.2. CBDC adoption won't make African countries earn a 'developed country' status

CBDC will revolutionize the payments system and expand digital financial services in African countries. However, it will not be enough to make African countries earn a "developed country" status. To earn a developed country status, African countries will need to address the poverty problem, increase GNP per capita, improve the standard of living of citizens, improve infrastructure, improve quality of life, develop their financial systems, and strengthen existing institutions.

4.3. CBDC adoption will not stop institutional corruption

Institutional corruption manifest when there is a systemic influence which may be legal, or even currently ethical, that undermines an institution's effectiveness by diverting it from its purpose or weakening its ability to achieve its purpose (Lessig, 2013). Adopting central bank digital currency may not stop institutional corruption in African countries because most institutionalized corruption often occur at the contract documentation stage, contract implementation stage and contract enforcement stage but not at the payment disbursement stage where contract payments can be made using central bank digital currency.

4.4. CBDC adoption will not stop illicit activities in African countries

There are many illicit activities in African countries such as kidnapping for ransom, terrorism, smuggling or money laundering. These illicit activities are more pronounced in Sudan, Kenya, Mali, and Nigeria. Many of such illicit activities are carried out using cash. It has been argued that central bank digital currency can reduce cash-based illicit activities in African countries. The truth is that, while CBDC may reduce cash-based illicit activities, criminals will look for other sophisticated ways to engage in illicit activities when paper money is in limited supply due to widespread adoption of CBDCs. So, the argument that CBDC will reduce cash-based illicit activities in African countries is a weak argument.

4.5. CBDC may not reduce the level of poverty in African countries

A central bank digital currency is just another medium of exchange or a means of payment. A central bank digital currency is not a welfare programme. It is not designed to be a welfare support system. Rather, it is designed to be an alternative payment solution. For this reason, a central bank digital currency does not have a 'direct' effect on the level of poverty in African countries. This is a very important distinction to make. A central bank digital currency may have an 'indirect' effect on the level of poverty because, arguably, a central bank digital currency can facilitate targeted welfare payment and increase financial inclusion for the poor, thereby empowering them to have access to finance which they can use to improve their well-being. But, these effects are 'indirect' effects of CBDC not a 'direct' effect of CBDC.

5. Conclusion

The purpose of this article was to discuss what a central bank digital currency can achieve in African countries and what a central bank digital currency may not achieve in African countries. This study showed that a central bank digital currency can achieve the following in African countries. A CBDC can become a monetary policy tool; it can reduce the size of the informal economy; it can increase financial inclusion; it can increase digital financial literacy; it can stop the circulation of counterfeit paper money; it can deepen existing payments system; it can improve social programmes and targeted welfare; it will increase transaction monitoring and surveillance; it can address tax evasion and increase tax revenue in African countries. On the other hand, the study showed that a CBDC may not achieve the following in African countries. A central bank digital currency may not completely replace cash in African countries; CBDC adoption won't make African countries earn a 'developed country' status; CBDC adoption may not stop institutional corruption; CBDC adoption will not stop illicit activities in African countries; and CBDC may not reduce the level of poverty in African countries. Issuing a central bank digital currency in African countries is a big step towards digital payment system revolution for the African continent. It is recommended that the monetary authorities in African countries

should understand the associated benefits, costs, and risks of issuing a CBDC. They should be ready to harness the full benefits of a central bank digital currency. While there is much expectation from a central bank digital currency, it is important for African bank central banks to understand what a central bank digital currency can achieve in African countries and what a central bank digital currency cannot achieve in African countries. Policy makers must understand the opportunities that central bank digital currency present, the foregone alternatives of issuing a central bank digital currency, and the limits of using a central bank digital currency. They should bear in mind that a central bank digital currency is, at best, an experiment. Therefore, it is yet to be seen whether central bank digital currency in African countries will become very successful and live up to its promise in African countries.

Future studies on CBDC in Africa can examine the socioeconomic effect of issuing a central bank digital currency in African countries. Such studies should assess the implications for poverty reduction and economic development. Such studies can offer insight into whether central bank digital currency can improve the general wellbeing of citizens in African countries.

Reference

Ahiabenu, K. (2022). A comparative study of the design frameworks of the Ghanaian and Nigerian central banks' digital currencies (CBDC). FinTech, 1(3), 235-249.

Babin, R., Smith, D., & Shah, H. (2022). Central bank digital currency: Advising the financial services industry. Journal of Information Technology Teaching Cases, 20438869221116901.

Bjerg, O., & Nielsen, R. H. (2018). Who Should Make Kroner? – A Review of Danmarks Nationalbank's Analysis of CBDC. CBS Working Paper.

Bludnik, I. (2023). Central bank digital currency and the cashless economy: the African experience.

Camara, N., Dos Santos, E., Grippa, F., Sebastian, J., Soto, F., & Varela, C. (2018). Central bank digital currencies: An assessment of their adoption in Latin America. BBVA Researh Working Paper (No. 18/13).

Duho, K. C. T., Abankwah, S. A., Azu, G., Agbozo, D. A., Duho, V. S., & Atigodey, J. S. (2022). Central Bank Digital Currency in Ghana, the e-Cedi: Disruptions, Opportunities and Risks. Dataking Policy Brief, 6.

Edwards, S. (2021). Central Bank Digital Currencies and The Emerging Markets: The Currency Substitution Challenge (No. w29489). National Bureau of Economic Research.

Foster, K., Blakstad, S., Gazi, S., & Bos, M. (2021). Digital currencies and CBDC impacts on least developed countries (LDCs). The Dialogue on Global Digital Finance Governance Paper Series. Available at SSRN: https://ssrn.com/abstract=3871301 or http://dx.doi.org/10.2139/ssrn.3871301

Killingland, M., & Dahl, L. B. (2018). Central bank digital currencies–fad or the future? a framework for country level assessment of central bank digital currencies (Master's thesis).

Kumah, S. P. (2024). Cryptocurrency and African fiat currencies: A peaceful coexistence?. Economic Notes, 53(1), e12229.

Laboure, M. (2021a). Corporate Bank Research: The Future of Payments: Series 2 – Part II. When Digital Currencies become Mainstream [online]. Available from: https://research.db.com/Research/Article?rid=82185081-9b23-4f5a-8fd7-a454a9ee7b75-604&kid=RP0001&documentType=R&wt_cc1=IND-3015026-0000 [Accessed 30 April 2021].

Laboure, M., H.-P. Müller, M., Heinz, G., Singh, S., & Köhling, S. (2021b). Cryptocurrencies and CBDC: The Route Ahead. Global Policy.

Lee, E. (2020). Central bank digital currencies. Economic Diplomacy Initiative, Harvard Kennedy School, Belter Centre. September

Lessig, L. (2013). “Institutional corruption” defined. The Journal of Law, Medicine & Ethics, 41(3), 553-555.

Lucarelli, B. (2011). The economics of financial turbulence: alternative theories of money and finance. Edward Elgar Publishing. Cheltenham, United Kingdom

Mallinson, D. J. (2021). Policy innovation adoption across the diffusion life course. Policy Studies Journal, 49(2), 335-358.

Náñez Alonso, S. L., Echarte Fernández, M. Á., Sanz Bas, D., & Kaczmarek, J. (2020). Reasons Fostering or Discouraging the Implementation of Central Bank-Backed Digital Currency: A Review. Economies, 8(2), 41.

Oh, E. Y., & Zhang, S. (2020). Central bank digital currency and in-formal economy. Working Papers in Economics & Finance, 2020-11.

Oxford Analytica (2021). Digital currencies mark a tectonic shift for banking. Expert Briefings. https://doi.org/10.1108/OXAN-DB263446

Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. Borsa Istanbul Review, 18(4), 329-340.

Ozili, P. K. (2021a). Financial inclusion research around the world: A review. Forum for social economics, 50 (4)457-479

Ozili, P. K. (2022a). Central bank digital currency in Nigeria: opportunities and risks. In The new digital era: digitalisation, emerging risks, and opportunities (pp. 125-133). Emerald Publishing Limited.

Ozili, P. K. (2022b). Can central bank digital currency increase financial inclusion? Arguments for and against. In Big Data Analytics in the Insurance Market (pp. 241-249). Emerald Publishing Limited.

Ozili, P. K. (2023a). Central bank digital currency research around the World: a review of literature. Journal of Money Laundering Control, 26(2), 215-226.

Ozili, P. K. (2023b). A survey of central bank digital currency adoption in African countries. The Fourth Industrial Revolution in Africa: Exploring the Development Implications of Smart Technologies in Africa.

Ozili, P. K. (2024a). 100 Quotes about central bank digital currencies.

Ozili, P. K. (2024b). Central bank digital currency and the monetary policy and financial stability implications. In Digital Currency Assets and Challenges to Financial System Stability (pp. 52-62). IGI Global.

Priyadarshini, D., & Kar, S. (2021). Central Bank Digital Currency (CBDC): Critical Issues and the Indian Perspective. IEG Working Paper No. 44.

Rochon, L. P. (1999). Credit, money, and production: an alternative post-Keynesian approach. Edward Elgar Publishing. Cheltenham, United Kingdom

Ward, O., & Rochemont, S. (2019). Understanding Central Bank Digital Currencies (CBDC). Institute and Faculty of Actuaries.

Wang, P., & Yip, C. K. (1992). Alternative approaches to money and growth. Journal of Money, Credit and Banking, 24(4), 553-562.

Wang, H., & Gao, S. (2024). The future of the international financial system: The emerging CBDC network and its impact on regulation. *Regulation & Governance*, 18(1), 288-306.