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Rethinking the Rise of Global Central Bank Digital Currencies: A Policy Perspective

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Abstract: This article discusses the impact of central bank digital currency (CBDC) from the perspective of monetary and fiscal policy. We mainly discuss how retail CBDC can improve traditional policy performance. We argue that A CBDC helps existing monetary policies to break through the zero lower bound, shorten the policy time lag, realize selective policy interventions, and make possible the price level target policy system. Similarly, the combination of CBDC and smart contracts can directly affect the performance of the fiscal policy. Compared with the convenience and impact of CDBC as a medium of exchange, its impact as a policy tool is more profound. The current monetary policy is facing a zero lower bound. The fiscal policy is facing a huge sovereign debt crisis and the impact of other private digital currencies on fiat money, which makes the importance of CBDC as a new policy tool more prominent. However, the research on CBDC as a policy tool has many fundamental questions that remain to be answered. This paper contextualizes CBDC with global challenges in policies and new technology advances, and the authors rethink CBDC from a policy perspective, which may provide many new thoughts and have implications for the rise of global CBDC.

Keywords: CBDC, monetary policy, fiscal policy

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China is experimenting with the first central bank digital currency (CBDC). It is different from cryptocurrency like Bitcoin in several important ways. The prime difference is the anonymity that drove early users to cryptocurrency. The second is that, unlike cryptocurrency, which is designed to be scarce, CBDC is susceptible to political influence and inflationary pressure. If CBDC fails on the parameters that was the upsides of cryptocurrency, why is China still pursuing it, and why are other countries thinking along these lines? Many countries are considering whether, when, and how to issue CBDC, such as the Central Bank of Sweden and the Bank of England (Davoodalhosseini, 2018; Ferrari et al., 2020; Meaning et al., 2018; Andolfatto, 2018). The reason most media articles provide revolves around geopolitical considerations (Rosa & Tentori, 2021), international trade (Paterson, 2021; Dent, 2021), and international finance (Wang & Gao, 2020).

Some may argue that CBDC avoids the logistical issues and costs associated with physical printing bills, engraving coins, and combating counterfeiting. However, China has largely become a cashless society (Chong, 2019; Lu, 2018; Chern et al., 2018) over the last ten years, thanks to the widespread use of WeChat Pay and Alipay. We provide an economic rationale behind e-CNY that is as rooted in longstanding economic theories as it is in recent economic developments.

First, the recent success of the US policy in combating the economic fallout of COVID-19-related shutdowns by large-scale deployment of helicopter drops has highlighted the importance of this economic tool unlike at any other time in history (Cukierman, 2020; Sharma et al., 2020).

Second, Fiscal policy actions during the great recession of 2008 were deemed to have been partially successful, and so were tax cuts instituted later because a significant percent of the population used the funds for debt payoff or savings instead of spending it. This significantly reduced the utility of such a fiscal policy action because the multiplier effect never got into play (Spilimbergo et al., 2009; Mankiw, 2010; Auerbach et al., 2010; Tcherneva, 2011; Romer, 2012).

Third, until recently, monetary policy actions had been preferred primarily because of the long administrative/implementation lag associated with fiscal policy actions (Arestis & Sawyer, 2004; Azad et al., 2021). A CBDC reduces this lag considerably.

At the same time, the effectiveness lag of helicopter drops may be even less than that of monetary policy actions. CBDC makes helicopter drops significantly more effective, not only because CBDC can be instantly put into the hands of the public, but also because of the smart contracts that can be in-built into the currency, which can be used to direct the use of the CBDC to the intended purpose. In the interest of completeness, the authors will also discuss some of the drawbacks and limitations of CBDC.

The problem of lagging relief funds during the COVID-19 pandemic has exposed flaws in the US financial infrastructure. Hence, the US government had a positive shift in the attitude towards CBDC, attempting to fill the gaps in traditional financial services with

digital currency, as well as actively conducting research related to digital dollars. The 2020 Digital Dollar Project released the report “Exploring a United States CBDC Proposal Polit Program,” which clarified how a CBDC in the US could address the common challenges faced by different stakeholders. The US government and private sectors may well work together in the future to promote the development of digital currency, meanwhile implementing a more comprehensive digital regulatory regime.

Technology Background and Framework

Technology Background

Distributed Ledger Technology (DLT). Although not all CBDCs use DLT (Scorer, 2017), DLT technology is the core of CBDC technology (Danezis & Meiklejohn, 2016), similar to that of Bitcoin and other private digital currencies.^① For example, e-CNY, the CBDC issued by the People’s Bank of China, does not fully adopt DLT technology, while the Bank of Canada, the Bank of England, and the Monetary Authority of Singapore (MAS) are trying to adopt DLT technology in CBDC to facilitate the efficiency of cross-border transactions. Simply put, DLT technology allows decentralized participants to collectively record, share, replicate, and synchronize information, rather than relying on a central organization to manage information. This technology came out with Bitcoin. If DLT technology is used in a CBDC, it means that CBDC is decentralized and needs a mechanism to reach a consensus on the ledger. However, a CBDC is not the same as Bitcoin, meaning that many of Bitcoin’s design features would be neither necessary nor desirable for a CBDC. Therefore, the DLT technology in a CBDC that many researchers talked about is generally a “permissioned” DLT system, where the validators are known and recognized. Specifically, the central banks may use permissioned DLT and be the center solely to control user identity verification and payment management. We are almost sure that the People’s Bank of China is the center of the permissioned chain, and the central bank performs identity verification and recording. Commercial banks mainly act as the verification nodes of the private chain (Chen et al., 2021). Therefore, the central bank can obtain transaction information in real-time through this system.^② For example, through e-CNY, the central bank can obtain e-CNY flow information from commercial banks (as the verification nodes and wallet managers). This new source of information will revolutionize the monetary system and monetary policy.

Smart contract. The main function of smart contracts is based on DLT (blockchain)

① Based on DLT, there is also an important application with CBDC, called smart contracts (see below).

② Actually, the People’s Bank of China has designed a center for information management (Chen, et al., 2021).

to execute contracts automatically. Smart contracts are digital contracts allowing terms contingent on the decentralized consensus that is tamper-proof and typically self-enforcing through automated execution. It is worth noting that smart contracts are not just electronic contracts, but programs that automatically execute contracts according to actual conditions. Compared with the execution of traditional contracts, smart contracts can eliminate the interference of third parties and reduce the cost of contract execution. This enables smart contracts to increase contractibility and facilitate exchanging money, property, shares, services, or anything of value in an algorithmically automated and conflict-free way. Bartoletti and Pompianu (2017) empirically document how smart contracts are interpreted and programmed on various blockchain platforms. Weiss and Corsi (2017) discussed smart contract applications in the land registry in Georgia. Functional contract technology based on DLT technology may be applied to the field of CBDC, which makes CBDC potentially restricted by smart contracts in the process of serving as a medium of exchange, which provides a new fiscal policy tool.

The current literature on CBDCs focuses primarily on the associated computer technology and economic implications. For example, Danezis and Meiklejohn (2016), Scorer (2017), and Auer et al. (2020) discussed the possible technical framework of CBDC, mainly around the application of DLT technology in CBDC. Other scholars focus on the impact of CBDC on the financial system, such as Ketterer and Andrade (2016) on the impact of CBDCs on incumbent banks and their business models; Dyson and Hodgson (2016) on the impact of CBDC on the development of financial inclusion; Barrdear and Kumhof (2016) focus on the impact of CBDC on macroeconomic growth. The discussion on the reasons for the emergence of CBDC is still mainly focused on reducing transaction costs (Armelius et al., 2018), combating illegal transactions, and money laundering (Chen et al., 2021). Besides, many scholars have proposed the risk of “broadening banks,” that is, downscaling the role of the banking system. In addition, Berentsen and Schar (2018) proposed that deposit-based CBDC seems simpler and can obviously be made effective against money laundering and other illicit uses. Consistent with the e-CNY issuance management framework mentioned by Chen et al. (2021), CBDC is issued by the central bank, and the commercial banking system manages the electronic wallets of all users. This design can minimize the impact on the existing banking system and ensure most of the advantages of CBDC. As mentioned in the introduction, the authors argue that these advantages and risks do not fully explain the reasons for the emergence of CBDC.

We combine DLT and smart contracts with monetary and fiscal policy. Traditional policy theories just hypothesize that people in policy models are a rational decision-making block with little information about macro-level economic dynamics. Apparently, they are much different from what they hypothesized. For example, D’Acunto et al. (2021) found that there existed insufficient consumer response to the policy due to their cognitive

ability. Similarly, Ben Bernanke, then chairman of the US Federal Reserve, in a speech to the National Economists Club in 2013, also emphasized that the monetary policy effect also depends on public expectations (forward guidance). And D'Acunto et al. (2019) found that households that responded to forward guidance did not really exist. Most people do not care about inflation expectations when they make spending and saving decisions. DLT and smart contracts may fill the gap between the rational-people hypothesis and bounded-rational-people reality. DLT helps the central bank get to know every personal account and could use smart contracts to nudge individuals and households to make decisions consistent with the central banks' targets.

Under this technological view, we can rethink the rise of the global CBDC from a new perspective. Advances in DLT and smart contracts may help central banks to fix drawbacks in traditional theories in a micro way. In personal decision-making processes, central banks can use CBDC with DLT and smart contract technologies to influence their rational, bounded rational, and psychological computation process. In this way, CBDC could make a change in macro policy effects by fixing interest zero lower bound, conducting helicopter money manipulations, and getting higher fiscal multipliers.

This paper analyzed the advantages of CBDC from a policy perspective. Since the focus of this article is on the relationships between CBDC and policies, the CBDC we focus on is retail CBDC (This type of digital currency can be accessed by households and firms), not wholesale CBDC (This type of digital currency is only for banks or other financial institutions, which is used for large-value transactions and inter-bank clearing). The former focuses on payments and facilitates retail payments and financial development, so it is considered more important by most central banks (Boar & Wehrli, 2021). Therefore, the authors mainly discussed how CBDC affects households under the development of information and smart contract technology and corporate decision-making, which in turn affects the existing policy system.

The Framework

Governments around the world have gone on a massive fiscal expansion in response to the COVID-19 crisis, increasing government debt to levels unseen in 75 years. The fiscal multiplier in many countries and regions is not bigger than one. When conventional monetary policy is constrained by the zero lower bound (ZLB) during an economic crisis, increased government spending and lower tax revenue lead to a large rise in government debt and raise the risk of future tax increases. How to reduce fiscal risk or enhance the effect of fiscal policy is an important question. On the other hand, since the global financial crisis in 2008, major economies have carried out quantitative easing (QE) policies to varying degrees. QE is not only limited by the ZLB but also creates global inflation risks.

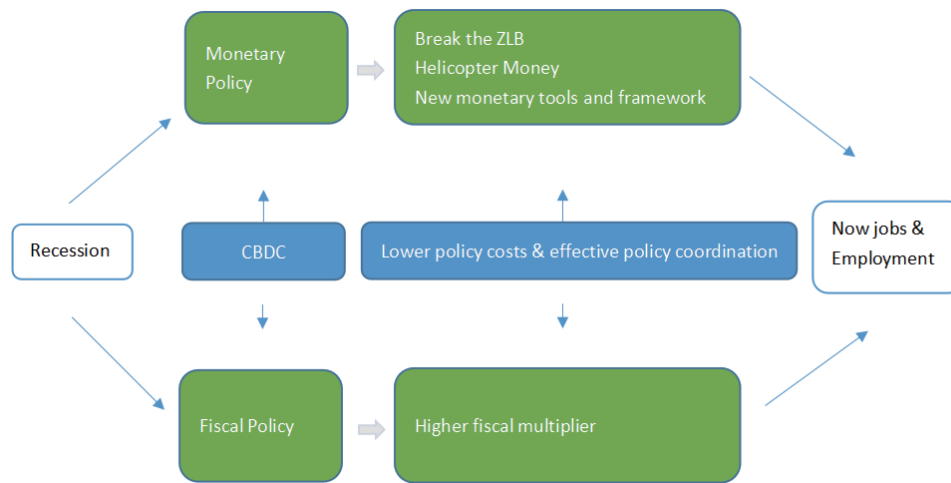


Figure 1 The Framework of CBDC and Policies

CBDC may effectively alleviate the above-mentioned policy dilemma. First, on monetary policy. CBDC can levy a “wallet fee” on it through e-wallets, i.e., achieve negative interest rates for CBDC, which could allow interest rates to be pushed below the ZLB (Dyson & Hodgson, 2016). Secondly, during special times, such as during the COVID-19 pandemic, the policy of helicopter money can be easily adopted. Importantly, the monetary policy can be implemented and monitored through the wallets, which improves the transparency of the policy and reduces the policy time lag. Moreover, in terms of fiscal policy, CBDC can limit the investment behaviors of related companies through smart contract technology and then raise the multiplier of fiscal policy. The impact of CBDC on the policy system may be very profound. The authors explore and discuss the transmission path of the policies, and for the most part, we focus on a specific form of CBDC: publicly accessible, account-based, and interest-bearing.^① The framework of this article is shown below; see Figure 1.

From the perspective of the combined technology and policy, we discussed CBDC from a new framework. Based on DLT and smart contract technology, CBDC could improve policy effects from a micro-level decision-making process. Particularly, from a household or personal view, DLT could transmit information that is important in the economic and financial decision-making process. Also, smart contract technology could change some costs and benefits when households make these decisions. Therefore, the central bank could introduce CBDC as a policy device which could improve policy effects in a micro way.

① This is the main type of CBDC discussed at this stage, such as Meaning et al (2018), Bank of Canada (2017), Bindseil (2019).

CBDC Can Transform the Monetary Policy System

CBDC may change all aspects of monetary policy, thereby improving monetary policy transmission channels and policy transparency. Since CBDC can transmit transaction information to the central bank, the central bank can intervene in the implementation effect of monetary policy and shorten the policy time lag. On the other hand, the CBDC wallet system can directly issue CBDC to consumer accounts to achieve helicopter money (e.g., subsidies to needy families during COVID-19; the Chinese government sent random red envelopes to residents through e-CNY wallets in 2020). At the same time, the wallet can provide interest for CBDC or collect wallet management fees, which makes it possible to break through the ZLB with the help of CBDC. Finally, CBDC may change the traditional monetary policy model with the nominal target of interest and inflation rates and use the price level or price index as the intermediate target, which is more conducive to the stability of currency values and inflation expectations.

Influence the Transmission of Monetary Policy

Administrative/Implementation lag. The time lag for the monetary policy effect is an important factor that cannot be ignored. It has very special practical significance for improving the effectiveness of monetary policy. The time lag is usually divided into inside time lag and external time lag. The former refers to the government's decision-making time lag, and the external time lag refers to the time lag brought by the monetary policy transmission mechanism. The traditional research on monetary policy time lag mainly studies the external time lag, such as Friedman and Schwartz (1963), Friedman (1965), Cagan and Gandolfi (1969) on the monetary policy time lag, and later the monetary policy transmission mechanism (Bernanke & Gertler, 1995; Ehrmann & Fratzscher, 2004; Takáts & Vela, 2014). Koop et al. (2009) found that the transmission mechanism of monetary policy changes over time, although they did not discuss the reasons for the change in the transmission mechanism. Similarly, Cecchetti (1999) found that the effects of monetary policy in different regions of the euro area were different and believed that the legal structure and financial structure of different regions affected the transmission mechanism of monetary policy.

We believe that the technical characteristics of CBDC can reduce internal and external policy time lags and change the transmission mechanisms of monetary policy. In the interest-targeted and inflation-targeted monetary policy systems, in the policy formulation stage, the central bank can quickly understand market information through CBDC and incorporate the information into the policy formulation process. Most importantly, the central bank can directly access the market through CBDC by controlling the level of interest rates and prices (We discuss this new monetary policy system in Section

C below.), thus greatly reducing the external lag of monetary policies. For example, Meaning et al. (2018) discussed CBDC's potential impact on the monetary transmission mechanisms. Specifically, they consider how CBDC might affect the process of monetary policy decisions and the channels, speed, and strengths. They talked about three broad stages of the monetary transmission mechanism: setting of the policy, changes in the price and interest rates, and financial market movements to the real economy, and it is likely that CBDC can strengthen the monetary transmission mechanisms.

Helicopter drops. As mentioned earlier, CBDC can issue money (or Helicopter drops) directly to consumers through e-wallet accounts. Although a Helicopter drop is a taboo in monetary policy, it has become a special kind of monetary policy during COVID-19, and CBDC can implement it easily (Dyson & Hodgson, 2016). And in the process of a recession, a helicopter drop is more effective than quantitative easing (QE), which is mostly used in severe recessions when inflation targets cannot be met (Cukierman, 2020). On the one hand, the impact of a helicopter drop on consumers is more direct and rapid; Dyson and Hodgson (2016) mentioned that the bank of England could implement a helicopter drop through CBDC to easily achieve policy goals. On the other hand, compared with QE, implementing a helicopter drop through CBDC can inject liquidity in a more precise direction without worrying about flooding liquidity, which is a big problem with traditional QE (Wu, 2020).

The New Tool to Break ZLB

The traditional monetary policy transmission path mainly achieves policy goals through the level of interest rates. A CBDC wallet can realize an interest-bearing CBDC and adjust the cost and benefit of holding CBDC through wallet management systems (usually commercial banking systems, such as e-CNY's wallet management system). Berentsen and Schar (2018) argue that interest on CBDC would use the interest rate paid on CBDC accounts as its main policy tool. At this stage, monetary policy in many regions has fallen into a zero-lower bound (ZLB) of the real interest rate. In the traditional monetary system, the nominal interest rate drops to zero, and the central bank's monetary policy has no way to further reduce the interest rate. ZLB would be a floor of any monetary policy aiming at lowering the interest rate to stimulate aggregate demand. However, in a CBDC system,^① it is possible for the central bank to implement negative nominal interest rates which can break the ZLB constraint (Ward & Rochemont, 2019), such as charging CBDC accounts (Yao, 2018; Fang & Huang, 2020). It is worth mentioning that Mohammad and Davoodalhosseini (2021) established a theoretical model to study the CBDC and monetary

^① To achieve a negative interest rate policy requires pure CBDC (Bordo & Levin, 2017), because if both cash and CBDC exist, then when the central bank charges the CBDC account (wallet), the depositor will convert the CBDC into cash to reduce losses.

policy and found that CBDC has certain potential benefits, such as the possibility that it can bear interest. However, they also mentioned that this brings costs when using a CBDC system. They compared the cash system, only the CBDC system, and both cash and CBDC systems, and they argued that if the costs of the CBDC system are not too high and more efficient, CBDC is better than the cash system. But in the hybrid system, the CBDC may not be helpful. To all studies hitherto, the feasibility and efficiency of CBDC-related monetary policies are still a challenge in theory and in reality.

A New Policy Paradigm: Price Level Target (PLT)

The intermediate target (or nominal anchor) of traditional monetary policy is mainly the interest rate or inflation level target (ILT) (McCallum, 1996; Bernanke & Mishkin, 1997; Levin et al., 2004; Beechey et al., 2011). But in practice, this intermediary goal is increasingly difficult to help the central bank achieve its stated policy goals. One reason is that this intermediary goal is not the final target variable of monetary policy (such as consumption and employment). Since the transmission path of monetary policy is not very clear, especially after the application of new technologies in the financial field makes the transmission path of monetary policy more complicated (Mumtaz & Smith, 2020; Hansen et al., 2021): This goes against the principle of “transparency” required by traditional monetary policy.^① Another reason is the uncertainty created by the conflicting goals of governments and central banks. In theory, the central bank’s policy (inflation) target can be kept at a fixed and reliable specific value. For example, central banks have a target of 2 percent inflation. However, in practice, the government may expect to raise the inflation target to boost employment and economic growth. Unfortunately, such a conflict could inadvertently undermine the credibility of the central banks’ nominal anchor. For example, Cargill et al. (2003) and Alesina & Stella (2010) mentioned that monetary policy was influenced by political factors.

The introduction of CBDC may end the monetary policy dilemma mentioned above because CBDC can take the price level as the policy target (price level target, PLT). As the nominal anchor, the price level directly affects consumption and employment and cannot be affected easily by political factors, which directly enhance the credibility and sustainability of monetary policies. Since CBDC can provide the central bank with relevant information on the price level, the central bank can adjust the money supply through the CBDC market so that the price level reaches the target level. More importantly, the PLT system has better transparency than ILT. Cheung (2017) proposed a monetary policy system (i.e., the PLT system) with the domestic final consumer price

^① Federal Open Market Committee (FOMC) “seeks to explain its monetary policy decisions to the public as clearly as possible. Such clarity facilitates well-informed decision-making by households and businesses, reduces economic and financial uncertainty, and increases the effectiveness of monetary policy...” (https://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals.pdf)

as the nominal target, disclosed the combination information of final consumer goods, and adjusted the combination in time to prevent malicious attacks on the stability of the system. Bordo and Levin (2017) clearly stated that CBDC could realize the PLT monetary policy system and reduce the dilemma of the current ILT system.

CBDC Can Grow the Fiscal Multiplier

Given that CBDC adopts DLT technology to a certain extent, smart contracts can be applied to CBDC, which provides a new policy tool for fiscal policies. Traditionally, fiscal policies focus on “fiscal multipliers,” which mainly include government purchase multipliers and tax multipliers. These multipliers represent the increase (decrease) in total output generated by government fiscal expansion (contraction) by one unit of currency—the basic logic is that each dollar of government spending stimulates an increase in aggregate demand, which leads to higher labor demands and, thus, higher employment and wages. Much literature is devoted to measuring these multipliers. For example, Canzoneri et al. (2015) measured fiscal multipliers in recessions and found that fiscal multipliers did not perform the same in recessions as in booms. Similarly, Favero et al. (2011) and Leeper et al. (2017) argued that fiscal multipliers depended on the decision-making behavior of private firms and households, so the multipliers measured by different literature varied greatly (Ilzetzki et al., 2013). Cloyne et al. (2021) found that existing measurements showed multipliers between 0 and 2, with a large variation range. During COVID-19, many countries responded to the shock by adopting unprecedented fiscal stimuli. COVID-19 has led to massive unemployment, so supply is more responsive to demand-side stimulus in the presence of labor slack. At the same time, COVID-19 has led to a decline in household income, which pushes households against their borrowing constraint, thus increasing marginal propensities to consume (MPC). Using US data, Auerbach et al. (2021) found that government spending was stronger during the peak of the pandemic recession, and high MPC was an important factor. Auclert et al. (2021) proposed that MPC was generally high (0.25-0.5), and increasing fiscal multipliers by increasing MPC may not be the optimal channel. And they mentioned that marginal propensity to earn (MPE), measures how much they reduce their earned income, saying, “It is the labor market equivalent of the MPC.” Thus, during a recession, such as the COVID-19 shock, we are more focused on how to improve MPC, so we now discuss how CBDC can improve MPC.

Combining CBDC with smart contracts is one way to improve MPC. The first is the tax reduction policy. If the tax reduction policy is implemented through CBDC, the terms of the tax reduction can be written into the smart contract. For example, the amount of the tax reduction needs to be applied for consumption or investment, not for debt repayment. Tax breaks can affect consumer and investment behavior, but the benefits of tax breaks

do not directly affect consumption and investment. For example, Cashin and Unayama (2016), through their research on Japan's tax reduction policy, found that the impact of tax reduction policy on consumption was quite limited. Benzarti and Carloni (2019) further explored the effect of tax cuts on different objects; they found that 55 percent of the benefits of tax cuts went to company owners, while employees received relatively limited tax cuts, and consumers benefited the least. Recent studies have found that different consumers respond differently to tax cuts, which makes policy planning even more difficult (Bachmann et al., 2021). In conclusion, traditional tax cuts do not guarantee consumer promotion (and MPC). Implementing conditional tax reduction policies through CBDC and smart contracts can directly affect consumption, and it is possible to carry out targeted tax reductions for different types of consumers, such as tax reductions mainly for low-income and low-wealth families, because such household MPCs are more sensitive to tax cuts (Bachmann et al., 2021).

Similarly, government purchases can also be transacted through CBDC with smart contracts attached. Such conditional payments are subject to adjustments that can be tailored to the government's policy objectives. For example, the government has focused on small and medium-sized enterprise (SME) business failures during COVID-19. However, the government cannot directly target SMEs for targeted tax cuts or purchases. As a result, SMEs often do not receive sufficient policy support. On the contrary, policy support is obtained by companies that do not need them (Gourinchas et al., 2021). Therefore, fiscal policy exerted small and negative spillovers to output and employment. However, CBDC and smart contracts can amplify the spillover effects of policies; it is only necessary to write payment constraints on companies in smart contracts, such as requiring companies to increase transactions with SMEs.

Discussion

CBDC with DLT and smart contracts will introduce new thoughts into traditional theories. From monetary policy, traditional research focuses on policy time lag and, later, the monetary policy transmission mechanisms (Frideman & Schwartz, 1963; Cagan & Gandolfi, 1969; Ehrmann & Fratzscher, 2004; Koop et al., 2009; Takáts & Vela, 2014). The rise of global CBDC may push many economists to think about the advantages and disadvantages brought by technological advances (Meaning et al., 2018; Dyson & Hodgson, 2016; Wu, 2020). We focused on CBDC's policy impacts. Specifically, CBDC may impact traditional policy studies in the following ways: (a) CBDC may improve the monetary transmission mechanisms (Cukierman, 2020; Dyson & Hodgson, 2016); (b) CBDC could provide new tools to break ZLB (Ward & Rochemont, 2019; Yao, 2018; Fang & Huang, 2020); (c) CBDC could also establish a totally different price-targeted

policy system complimentary to traditional interest and inflation-targeted policy systems (Mumtaz & Smith, 2020; Hansen et al., 2021). (d) CBDC could raise the fiscal multiplier.

Relative to traditional monetary and fiscal policies, CBDCs also have the potential to address another policy-response friction, namely the underreaction of consumers to policies. As mentioned earlier, fiscal policy and monetary policy themselves are poorly targeted. In addition, there is also the problem of insufficient consumer response to the policies (D'Acunto et al., 2021). D'Acunto et al. (2021) found many consumers below the top of the distribution of a representative population by cognitive abilities barely reacted to monetary and fiscal policies that aimed to stimulate consumption and borrowing, "even when they are financially unconstrained and despite substantial debt capacity." Both problems are difficult to solve in the traditional policy system. This leads to unpredictable changes in policy transmission paths due to different cognitive abilities in the process of policy implementation. The application design of digital wallets in CBDC can connect with consumption scenarios through digital wallets in the process of policy implementation and can then design stimulus plans based on the characteristics of consumer behaviors. Similarly, policies often disproportionately impact firms during the implementation process, especially for small and medium-sized enterprises (Gourinchas et al., 2021). CBDC can implement special policies for SMEs through wallet designs, to ease the impact of policy adjustments on SMEs to minimize adverse effects on businesses. It can be expected that CBDC can distinguish the objects of policy implementation through technology and promote the development of inclusive finance.

The coordination of monetary policy and fiscal policy is an important research direction. Eggertsson (2006) finds that under monetary and fiscal policy coordination, the spending multiplier can reach as high as 3.4. Conversely, in the absence of policy coordination, multipliers fall to 0. Central bank independence has been supported over the last century. In the early days of the global financial crisis and the sovereign debt crisis, concerns were expressed about the relationship between central bank independence and government debt. During the COVID-19 pandemic, many governments conducted large fiscal packages leading to huge deficits, while central banks financed fiscal policy (large QE) (Cukierman, 2020). This creates huge inflation risks for the world. A policy system centered on CBDC may be a mechanism to reshape people's trust in money. For example, in a CBDC system, monetary policy can reduce the central bank's QE operation and increase the fiscal policy multiplier.

For those countries whose currency value is unstable, CBDC can directly use the price level as the nominal anchor to quickly stabilize the currency value. During the 2008 global financial crisis, the US pioneered QE monetary policy and led the rest of the world to follow this policy. As a result, economic development was mainly dependent on liquidity stimulus, and the outbreak of COVID-19 in 2019 deepened the crisis. In

short, the over-issue of money has deepened people's doubts about the value of money (or concerns about inflation), and decentralized currencies such as Bitcoin were born in this context. However, the current central bank digital goods still adopt a centralized discovery method, such as China's e-CNY, which still cannot alleviate concerns about currency values. This concern may be a big problem for CBDCs' intrinsic value.

In the interest of completeness, we will also discuss some of the drawbacks and limitations of CBDC. First, introducing CBDC is not costless. Mohammad and Davoodalhosseini (2021) used a theoretical model to study the potential monetary policy effects of CBDC and argued that CBDC might not be helpful if it creates higher costs. Similarly, most of the studies regarding CBDC put forward a variety of benefits, but each benefit can be materialized only under certain possible further conditions. On the other hand, CBDC allows the central bank to engage in intermediation and compete with commercial banks, yet the central bank is not an investment expert and may destroy the existing bank system (Fernández-Villaverde et al., 2021). Also, CBDC brings a host of challenges in technical and design questions (Allen et al., 2020). A well-designed CBDC requires DLT and smart contract technology to be extremely stable and resilient and with low operational costs. These requirements can be very difficult and need more in-depth research in the design of CBDC. Finally, CBDC-related policies need more detailed data about household and personal activity, which may be very hard to get, especially in countries where privacy is highly protected by law and culture (Ahnert et al., 2022; Rennie & Steele, 2021).

Conclusion

Although the advantages of CBDC are discussed in many aspects in the existing literature: the payment facilitation and financial development impact brought by CBDC as a medium of exchange, as a store of value (interest-bearing CBDC) to strengthen monetary policies, as a unit of value impacting currency stability, examining the impact of CBDC on the policy system, and many other potential impacts, we believe that combined with the shortcomings and potential risks of monetary policy and fiscal policy in terms of operation and effect at this stage, CBDC can effectively improve the fiscal policy multiplier and can also have a potentially profound impact on the monetary policy system.

We intend this paper to be a first step in the discussion on CBDC and policies, and many fundamental questions remain unanswered. For example, among other things, how does CBDC affect the entire financial system, how does it affect the actual economic operation, how does the relationship between the central bank and the government change under digital currency systems, etc.? Only further research on these issues can help policymakers adapt to a CBDC monetary environment.

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