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Central Bank Digital Currencies: Implications for the Turkish Lira

Muhammet DURDU¹ 

ABSTRACT

Central Bank Digital Currencies (CBDCs) are digital central bank liabilities that differ from traditional wholesale settlement and saving accounts. States worldwide commenced CBDC projects in response to the rising private digital payment instruments and crypto assets. Especially emerging countries are in danger of being invaded by these new payment providers. In addition, some states moved toward researching CBDCs due to the diminishing cash usage among their citizens. Türkiye is also under threat from those new payment providers. Therefore, the Central Bank of the Republic of Türkiye started the project of the national CBDC. With this project, Turkish society could be equipped with reliable and practical fiat money, which is crucial for preventing citizens from using the new digital payment providers. In addition, high informality in the economy could be minimized by making cash usage obsolete thanks to incentivizing digital central bank money.

Keywords: Central Bank Digital Currencies, Digital Turkish Lira, Informal Economy, Cash Usage.

JEL Classification Codes: E26, E31, E42, E52

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INTRODUCTION

Roughly a decade ago, Bitcoin emerged with aiming to become a world currency. But the money supply monopoly has been a crucial prerogative for sovereign states. Without sovereign currency with legal tender status, states lack the advantage of seigniorage income and the inflation tax. Consequently, states have commenced battling with Bitcoin usage in daily transactions. Using Bitcoin (and other crypto assets) in daily transactions has been banned in different parts of the world. Initially, states coined bitcoin and its fellows as “cryptocurrency”. Nowadays, they refrain from coining them as “currency”; instead, they call them “crypto assets” since the possible deterioration of “monetary sovereignty” (Group of Central Banks, 2020, p. 9).

States have logical reasons for battling with crypto assets as they were wielded in illicit transactions seen in the Silk Road incident in the USA. In their first years, limited users generally wielded Bitcoin and its fellows on the Dark Web. As time has passed, ordinary individuals have commenced using crypto assets for investment purposes in general. After the huge gains generated through crypto investments, taxation issues of crypto

assets have become an issue for states. Some states regulated taxation regimes for crypto assets, but a clear tax regime has not been constituted yet. In addition, they have regulated crypto asset exchanges for AML purposes. However, their virtual and decentralized structures make them generally hard to regulate (IMF Staff Report, 2020, p. 33).

The increasing tendency towards digitalization has been decreasing the usage of cash in daily transactions (Norges Bank, 2018, p. 15). The COVID-19 pandemic has hastened this process further (Deutsche Bank Wealth Management, 2020, p. 3). Most people in developed and emerging countries use bank money in digital form through their mobile apps which is not the liability of the central bank (Federal Reserve, 2022, p. 3; Norges Bank, 2018, p. 6). In addition, private digital currencies, including Bitcoin and other cryptocurrencies, paved the way to make obsolete central bank liabilities (Committee on Payments and Market Infrastructures, 2018, p. 3). Cash is the sole instrument for citizens to use reliable central bank money. Diminishing cash usage could culminate in breaking the direct link between citizens and central banks. This could reduce the impact of central bank

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policy decisions on the economy as a whole and leave individuals undefended against financial crashes, which cannot be completely assuaged by any deposit insurance systems (Browning & Evans, 2022, p. 2). To prevent these consequences, central banks have commenced researching central bank money in the digital form used by all citizens and maybe all people around the world (Auer, ve diğerleri, 2021, p. 2; Labonte & Nelson, 2022, p. 9, 10; Visa, 2022, p. 10).

Central bank digital currencies (CBDCs) are the answer to the rise of digitalization and the fall of cash usage by central banks. By using them, central banks endeavor to protect their sovereign power over the monetary system in their respective countries. In addition, they have a chance to increase their impact on the economy with CBDCs by eliminating effective lower-bound limits and directly contacting individuals. In this article, I will demystify CBDCs and try to grasp their implications for the Turkish Lira (TL). At the outset, I will focus CBDCs in general and, afterward, try to show some risks for the Turkish economy and demonstrate some characteristics of the CBDC that are convenient for the Turkish economy.

CBDCs

In today's world, there are two central bank liabilities in markets. One of them is cash, which can be used by citizens and everyone worldwide if there are acceptors of that liability. The other one is the wholesale settlement and saving accounts in digital form, used by banks and some other specific financial institutions (Committee on Payments and Market Infrastructures, 2018, p. 1; Bech & Garatt, 2017, p. 59). Cash usage is decreasing around the world, insomuch that, in some places, there are limited shops to accept cash because of the burden it brings to the shop owners (Bech & Garatt, 2017, p. 64). If cash ceases to be used in daily transactions, there is no direct link between the central bank and society. This could narrow the ability of the central bank to steer the economy. Thereby central banks try to achieve a society in the digital form directly; otherwise, their sovereign power over the monetary system could weaken. This necessity has resulted in research on CBDCs around the world (Group of Central Banks, 2020, p. 5). Other reasons for CBDCs include encouraging financial inclusion, improving cross-border payments, facilitating direct fiscal transfers from states to society, and supporting public privacy (Group of Central Banks, 2020, p. 6). Few

emerging economies have already commenced their CBDCs lately (Kosse & Mattei, 2022, p. 1).

Defining CBDCs

Defining the CBDC concept is challenging since its fundamentals are not laid down appropriately yet. They could be concisely defined as sovereign fiat money in digital form. According to Bank for International Settlements (BIS) *"CBDC is a digital form of central bank money that is different from balances in traditional reserve or settlement accounts"* (Committee on Payments and Market Infrastructures, 2018, p. 4). Kosse and Mattei defined them as *"A CBDC is central bank-issued digital money denominated in the national unit of account, and it represents a liability of the central bank"* (Kosse & Mattei, 2022, p. 2). Lastly, according to FED, *"a digital liability of a central bank that is widely available to the general public"* (Federal Reserve, 2022, p. 1).

Classification of CBDCs

CBDCs are generally classified according to their users mainly. On the one hand, general-purpose (retail) CBDCs, are used by individuals without limits like cash. On the other hand, wholesale CBDCs, are used by specific financial institutions for settlement and saving purposes, like the RTGS system¹. Central banks keep researching both, but general-purpose CBDCs have more challenging and rewarding implications because there are also wholesale digital central bank liabilities nowadays, making wholesale CBDCs familiar to the financial world. Wholesale CBDCs could benefit some countries, but this work will mostly focus on general-purpose CBDCs.

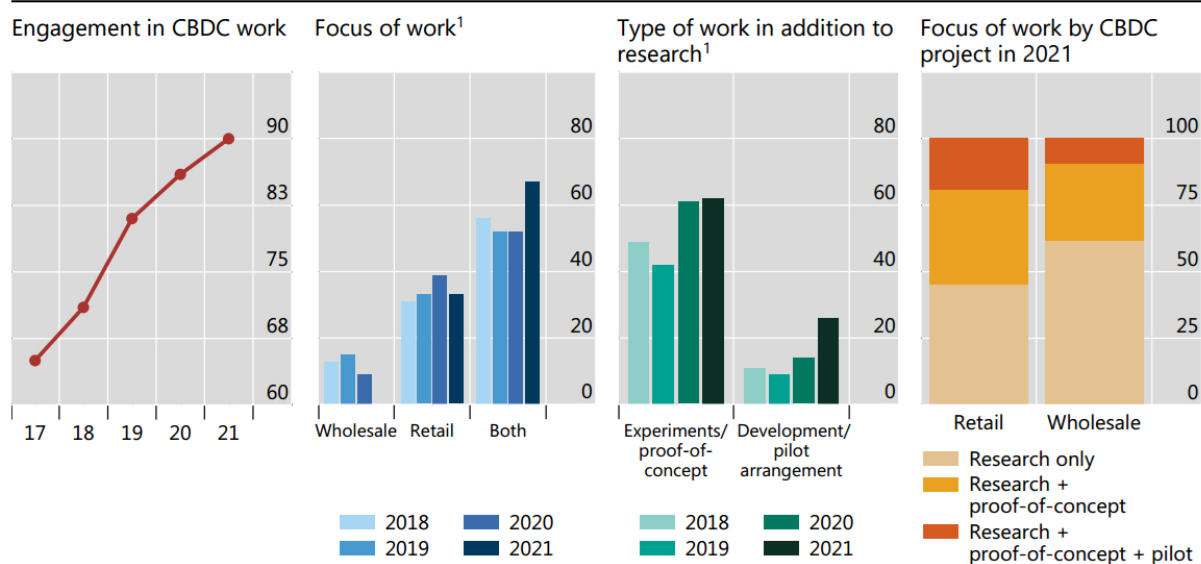
Central banks around the world have been investigating the CBDC concept to find out whether they wield this new phenomenon to improve their financial system. For example, in Sweden, Sveriges Riksbank, the central bank of the state, commenced the "e-krona" project in 2017 to respond the extinction of cash usage in the society (Sveriges Riksbank, 2023). The European Central Bank has also on the way to issue "digital euro". They planned that the digital euro will be distributed by intermediaries like bank, be available both online and offline, and give a chance to society to access the digital central bank money directly (European Central Bank, 2023). The Federal Reserve, the central bank of the USA, has been

¹ RTGS is a real time settlement system used between central bank and other banks in Europe. Refer to: (Bank of England, 2023).

Table 1: Central bank involvement in CBDC projects

Share of respondents

Graph 1

¹ Share of respondents conducting work on CBDCs.**Source:** (Kosse & Mattei, 2022, p. 4)

investigating the CBDC concept. They committed the cash usage even if they issue “digital dollar”. Federal Reserve Chair Jerome Powell said that the bank needs the approval of Congress to issue digital dollars (Board of the Governors of the Federal Reserve System, 2024).

It is possible to give more examples from different states about CBDC projects, but the foregoing instances are enough to prove the different objectives of CBDC projects. Each state has different needs and may design its expectative CBDC with different choices. Giving many examples of ongoing CBDC projects is not the main goal of this article. This work tries to demystify the CBDC concept further by giving general characteristics of them in the following section.

General Characteristics of CBDCs

General-purpose CBDCs are classified in themselves according to various technical and economic criteria. These criteria include token or account-based, interest bearing or not, universal or limited to the respective country, offline functionality or not, available times, ledger structure, and implemented with or without cash (Gnan & Masciandaro, 2018, p. 10). To make decisions about these issues, central banks should consider all relevant variables, specific to the related country, and

work with related stakeholders such as tax authorities, bank regulators and governments. It is supposed to exist various CBDCs in the future, and each of them is expected to be specific to a country. There will be no one-fit-all solution (IMF Staff Report, 2020, p. 7). Conversely, states should work together to reshape the financial structure because there is a good chance to increase the efficacy of the international financial structure. It could be possible to decrease the burden of international money transfers and increase their speed. Interoperability between CBDCs is of paramount importance to achieve these utilities. If this opportunity is missed, it will be more difficult to operate the international financial market in the future (Labonte & Nelson, 2022, p. 20).

The first prominent taxonomy of general-purpose CBDCs is token-based or account-based. Token-based systems consist of independent units, which is called “token”, and digital wallets. Individuals wield a digital wallet to store their tokens just like the cash system (Bossu, ve diğerleri, 2020, p. 11). Thanks to the cryptography between the user and the wallet, token-based systems can ensure anonymity however illicit users may exploit this anonymity. Most states will probably have preferred account-based systems to prevent this result and ensure the AML requirements. Account-based systems resemble contemporary bank accounts. With this system, users will

have precise accounts. The balance of these accounts is kept by intermediaries or less likely by central banks since central banks do not have sufficient experience in consumer relationships (Labonte & Nelson, 2022, p. 25; Lis & Gouveia, 2019, p. 13). Besides, there are plenty of public and private banks, fully fledged in financial services like AML requirements which could be used for intermediary services in the CBDC system (Didenko & Buckley, 2021, p. 16-18). Preferring the account-based model with intermediary services of banks is the most likely solution in this respect. Privacy concerns in the account-based model are also current for today's systems. In other words, there is no new problem with an account-based CBDC from the privacy perspective. Moreover, the ECB made important tests on an account-based model for alleviating privacy concerns which have crucial implications for practice (ECB, 2022). In addition, CBDCs raise concerns about bank runs (Committee on Payments and Market Infrastructures, 2018, p. 2; Bech & Garatt, 2017, p. 63). Thanks to the intermediary function of banks, such concerns may be alleviated since customers have not the choice to transfer their funds to the central bank directly in case of bank stresses. Banks keep on providing money instruments to the public in turbulent times.

Another reason for states to refuse the token-based model is the anonymity that the token-based model ensures. Anonymity could make a CBDC convenient for illicit users. It is unthinkable wielding a financial product provided by a state for illicit purposes. Hence, states will have chosen an account-based model to ensure AML/CFT requirements. It could come to mind that states also provide society with an anonym medium of exchange, namely cash. But the anonymity in cash is not the choice of states. It is a historical happenstance (Bech & Garatt, 2017, p. 65).

The question of whether interest-bearing or not is the most important preference when designing a CBDC from an economic perspective. Since the 2008 financial crisis, low-interest rates have been the primary option for developed countries. However, lowering the interest rates has a limit, which is called the effective lower bound. Because cash ensures individuals zero interest rate, lowering the rates below zero will direct individuals to hoard cash instead of using bank accounts. Hence it is not an option to cut rates below zero as cash is in use (Ward & Rochemont, 2019, p. 12). But with a CBDC,

removing cash from the market could be possible, eliminating the effective lower bound. In addition, cash is the main source of the informal economy, resulting in tax evasion, especially in emerging and frontier regions. Although central banks do not prefer the elimination of cash (Group of Central Banks, 2020, p. 10), it should be considered that a CBDC system could make possible to eliminate cash if the system has a reliable offline function. Without the offline execution capacity, a CBDC system cannot be convenient to take cash off the market in case of online system failures like power cuts.

Today, because of excessive intermediary institutions and security requirements, international settlement systems are not efficient and fast, resulting in the loss of time and money (World Bank Group, 2021, p. 32). With the beginning of CBDCs, the world has a chance to improve international settlement systems. To ensure a quicker and more efficient international settlement system, it is imperative for states to work together in establishing the CBDC systems which is a priority of G20 countries (Financial Stability Board, 2021). Each state has a different priority when establishing its own CBDC system. Besides these priorities, states should consider the interoperability of the CBDC systems worldwide. Otherwise, they will miss a paramount opportunity to improve the international settlement system (Group of Central Banks, 2020, p. 2; Kosse & Mattei, 2022, p. 8; IMF Staff Report, 2020, p. 6; Labonte & Nelson, 2022, p. 20).

The importance of CBDCs' available times has lost its merit since the emergence of 7/24 available central bank systems like FAST². Asserting the digital transformation, CBDCs have no choice but to operate 7/24 since it is expected that CBDCs improve the ease of use of financial systems (Federal Reserve, 2022, p. 2; Visa, 2022, p. 23). Owing to its technologies, CBDCs will be expected not only to operate at all times but also to activate smart contracts making money smart for various reasons including restricted spending areas for stimulation funds namely helicopter money and making payments between smart devices automatically.

The distributed ledger option for CBDCs is unfavorable to the throughput and velocity concerns. Besides, full

² The Instant and Continuous Transfer of Funds (FAST) System is a system developed within the framework of the Central Bank of the Republic of Türkiye (CBRT), where customers can send payment instructions through banking systems 24/7, operating independently from the Electronic Funds Transfer (EFT) system and managed by the CBRT. Refer to: (CBRT, 2024).

control over the system is an indispensable feature for central banks, which could be achieved owing to centralized systems. The cyber-security ensured by distributed systems could be achieved by other methods (Group of Central Banks, 2020, p. 8, 15; Auer, ve diğerleri, 2021, p. 13). Central banks do not prefer to use distributed systems like the Bitcoin system operated by all willing miners (Auer, Cornelli, & Frost, Rise of the central bank digital currencies: drivers, approaches and technologies, 2020, p. 18).

As the financial structure has evolved, real-time settlements with 7/24 operation times have become widespread across the globe, and payment systems have become extremely durable, especially in developed countries. For this reason, some opinions in developed countries impugn the necessity of CBDCs. According to them, it should be studiously researched whether CBDC could improve the financial system before establishing it (Labonte & Nelson, 2022, p. 7; Norges Bank, 2019, p. 6; Gnan & Masciandaro, 2018, p. 20). It seems that CBDCs could bring more benefits to emerging countries than developed one since developed countries also have a foremost financial system.

DETERMINING THE CHARACTERISTICS OF THE DIGITAL TURKISH LIRA

Türkiye is one of the countries researching for implementation of CBDCs. The system is called the "Digital Turkish Lira (DTL)". The practice test of the system has been made in 2023. It is important to consult the public while making such a big reform in the monetary system. The Central Bank of the Republic of Türkiye (the CBRT) should release an official report and make public consultation about this project. The DTL's technical and economic features are not certain for the public hitherto. The sole technical thing the public knows is the possible implementation of blockchain technology in the project.

Türkiye, an emerging country, has an immense informal economy. The primary source of the informal economy in the country is cash usage. A CBDC could help combat this issue which is detrimental to not only fiscal revenue but also tax fairness perception among taxpayers. With a CBDC, the CBRT could minimize cash usage in the market, making concealing taxable gains and transactions hard or even impossible for taxpayers.

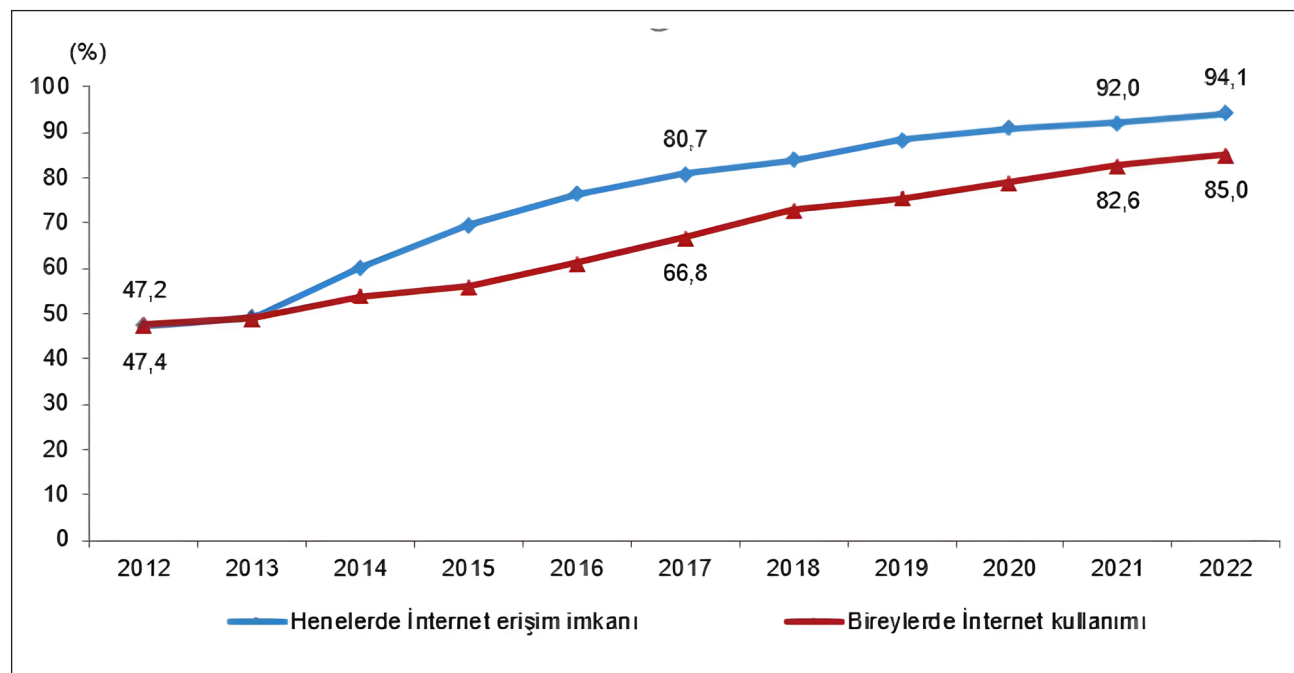
In addition, private digital money suppliers and crypto assets are able to invade daily transactions as a medium of exchange. Besides, another CBDC belonging to a developed country could weaken the TL's position further in terms of both medium of exchange and store of value since Turkish society tends to wield a stable foreign currency as a store of value (T.C. Cumhurbaşkanlığı Finans Ofisi, 2021, p. 35). A reliable CBDC system could help to improve the trustworthiness of the TL.

In order to describe the characteristics of potential DTL, it is crucial to understand the Turkish economy. In the following subsections, we will present important aspects of the Turkish economy crucial for designing the DTL. Afterward, possible threats coming from digital currencies, crypto assets, and other CBDCs for the monetary sovereignty of the state will be demonstrated. Finally, according to the literature review and experimental samples, some features that must be found in the DTL will be recommended.

General Features of the Turkish Economy Relating to CBDC

Türkiye is an emerging country and a member of the G20 countries. It is a candidate for European Union and has a population relatively younger than developed countries. Turkish people tend to easily adopt information and communication technologies. Internet usage among Turkish people keeps on increasing. According to the survey implemented by the Turkish Statistical Institute, the proportion of internet usage is 85% for individuals in the 16-74 age group. 94.1% of households have access to an internet connection (See Table 1). Lastly, 46.2% of individuals buy or order goods and services over the internet (Turkish Statistical Institute, 2022). 85% of internet usage shows that the offline functionality of DTL is crucial for 15% of Turkish people if the government wants to eliminate cash from the market. In addition, internet usage is even less in the age group of more than 74. To prevent financial exclusion for those not using the internet, it must be done with the DTL having offline functionality or maintaining the cash in the market (Ward & Rochemont, 2019, p. 8).

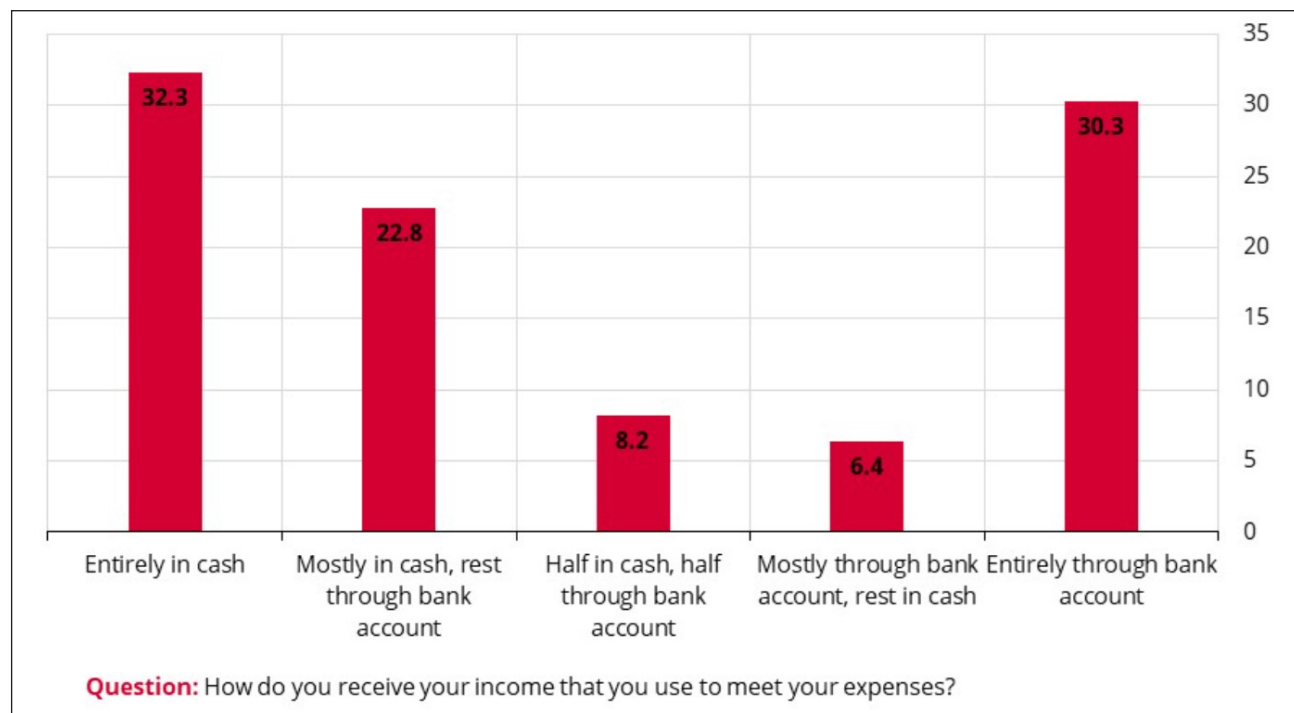
Türkiye, like other emerging countries, has a substantial informal economy and employment. It is estimated that the rate of the informal economy to the GDP exceeds 50% from time to time in Türkiye (Yurdakul, 2008, p. 209). But the estimation of the informal economy is not

Table 2: Internet usage in Turkish people

Source: (Turkish Statistical Institute, 2022).

based on any solid data culminating in different results by different academics (Erkuş & Karagöz, 2009, p. 133; Meriç & Günay, 2004, p. 910; Çalış, Çitak, & Çakır, 2022, p. 48; Davutyan, 2008, p. 261). Over the past ten years, the informal sector has grown even more due to the massive influx of refugees abroad. (Özbay, 2020, p. 4). According to the Turkish Statistical Institute, at the end of 2021,

the rate of employees who are employed informally is 27.8%. Informal employment is much bigger in farm employment than non-farm employment; the rate of it is 83.9%. On the other side, the non-farm informal employment rate is 18.3% (Turkish Statistical Institute, 2021). These high rates of the informal economy and employment in Türkiye demonstrate the social injustice

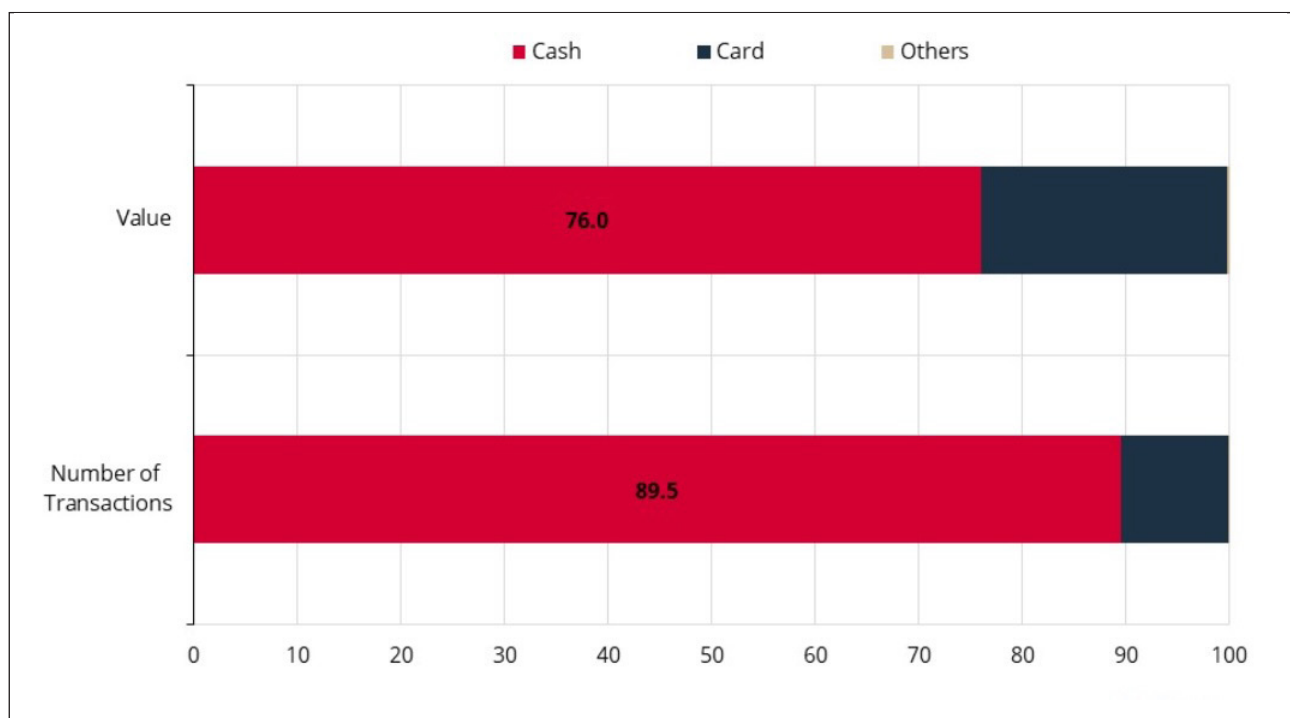
Table 3: Income receiving way in Turkish people

Source: (Çevik & Altınel, 2021).

in the country's tax system. Those who pay taxes and social insurance payments have disadvantages against those who do not pay them. With the DTL, which will eliminate cash usage from the market, this injustice could be assuaged. Because the main source of informal employment and economy is cash usage, malignant taxpayers may be desperate to disguise their employment and economic activities without cash usage. It has been expected that the informal economy problem cannot be resolved in the short term (Dam, Ertekin, & Kızılca, 2018, p. 315), even though it is declining (Bağır, Küçükbayrak, & Torun, 2021). But with a proper CBDC, this issue could be

anticipate using more cash in the coming year, while 11.9% anticipate using less cash. The rest do not think they will change their cash usage habits (Çevik & Altinel, 2021). This survey was implemented during the COVID-19 pandemic, and Turkish people kept using cash and thought about increasing their cash usage habits despite the virus-carrying effect of cash. These results demonstrate that cash usage is crucial for the Turkish economy, like other emerging countries (Maryaningsih, Nazara, Kacaribu, & Juhro, 2022, p. 6), and the DTL should be available for offline transactions or used alongside cash.

Table 4: Cash percentage in transaction number and amount



Source: (Çevik & Altinel, 2021).

eliminated before long (Auer, Cornelli, & Frost, Rise of the central bank digital currencies: drivers, approaches and technologies, 2020, p. 28).

Cash usage in daily life is very high in Türkiye. People mostly use cash for both their means of payment and their means of earning. According to the survey implemented by the CBRT in September/October 2020, the rate of individuals getting their income mostly or completely in cash is 55.1%, and 61.5% of people prefer to spend their money largely in cash. The rate of cash transaction number is 89.5%, and the rate of cash amount in transactions is 76%. 25.3% of respondents

Not only central banks but also other private and public banks make expenses for supplying cash to society (Didenko & Buckley, 2021, p. 22). For example, the FED, the Central Bank of the USA, has a 983.8 million USD budget to print USDs for 2022 (The Federal Reserve, 2022). When it comes to Türkiye, according to the audit report implemented by the Supreme Audit Court, also called Sayıştay, the CBRT spent 264.7 million TL for only banknote paper and ink in 2021 (Sayıştay, 2021). It seems negligible compared to the federal budget of the USA, which is worth 6 trillion USD and the general budget of Türkiye, which is worth 1.6 trillion TL (TBMM, 2022; Amadeo, 2022). However, removing them by

eliminating cash from the market grants governments essential additions to their budget. On the other side, 5-10% of banks' budgets consist of cash distribution expenses on average, which is an important burden on banks culminating in the rise of credit interests (Brugge, Denecker, Jawaid, Kovacs, & Shami, 2018). These resources could be used for more beneficial public services if cash usage becomes obsolete.

The Revenue Administration of Türkiye has made registering some payments through banking documents mandatory for some taxpayers to combat the informal economy. (Erkuş & Karagöz, 2009, p. 128). Thanks to a proper CBDC, all payments could be recorded through receipts helping to reduce tax losses and the informal economy. The DTL could be designed to provide the abolishment of cash usage. Policymakers should consider this choice seriously before making decisions about the characteristics of the DTL. In the next sections, we try to show some threats to the monetary sovereignty of Türkiye and describe a CBDC useful for the Turkish economy.

LITERATURE REVIEW

In this section, the academic works relating to the DTL project will be reviewed in brief. Ünlü and others have accentuated that the DTL project could enhance financial inclusion, make payments faster, weaken the informal economy, and ease the activities of the CBRT (Ünlü, Künc, Tutgun, & Çelik, 2023, p. 19, 20). Kara, Yapan, and Mutlu have stressed the risks of CBDC relating to personal liberty (Kara, Yapan, & Mutlu, 2023, p. 379). Acar has demonstrated the possible threats to banking sector coming from expectative CBDC projects (Acar M. , 2024). Acar and Öztürk have pointed out that specification of CBDC project should be determined having regard to necessities of respective country (Acar & Öztürk, 2021). According to Toraman, the DTL could become widespread against crypto assets in the Turkish society thanks to its trustworthiness arising from the CBRT (Toraman, 2022, p. 370).

Küçükkıralı and Eser Afşar, have put forward possible pros and cons of the DTL in their works. According to them, the DTL could assist the security and effectiveness of the financial system and monetary policy. In addition, it could increase the financial inclusion. By this means, the CBRT may gain an important tool against private digital money providers and decentralized systems. On

the other hand, a weak designated DTL and concerns about sensitive personal data could culminate in fading away the project. (Küçükkıralı & Eser Afşar, 2022).

Possible Threat to the Monetary Sovereignty of Türkiye

Private money providers in digital form and crypto assets are a serious threat to sovereign currencies in terms of money circulation in the respective country (IMF Staff Report, 2020, p. 6, 7). 25.7% of people worldwide use mobile private payment solutions in their transactions. People in emerging countries use mobile private payment solutions more than developed countries. For instance, 62.7% of China's population wield digital mobile payment methods with their phones. This rate is expected to increase in the coming years (MoneyTransfers, 2022). The mobile payment users rate among internet users is 84% in Kenya and 60% in Nigeria (Armstrong, 2022). During the severe inflation period, crypto assets are used widely in Venezuela for payment purposes, but there is no statistical information about them (Bergen, Bergen, Levy, & Semenov, 2022). These examples indicate that some private digital payment methods or crypto assets could invade especially emerging countries' monetary systems easily since citizens of emerging countries can easily adopt new payment methods due to the unreliable sovereign fiat currencies.

Türkiye is not immune to this new money providers' threat. The CBRT has already banned the usage of crypto assets as a medium of exchange. The rate of digital mobile payment methods is 21% in 2021 and keeps increasing in Türkiye (Strategy, 2021). To preclude the Turkish daily transactions market from being invaded by new private money providers, the DTL project is crucial since the CBRT could bring advantages of private digital currencies to the TL for enhancing the attractiveness of the TL (Labonte & Nelson, 2022, p. 17; Gnan & Masciandaro, 2018, p. 13). Even though they lack the security of having legal tender status, people may prefer more practical private payment methods against the Central Bank money. Through the DTL, the CBRT could enhance the convenience of the TL in daily transactions by using smart contracts. In this way, it could be easy to protect the TL's unit of account and medium of exchange functions. If a sovereign currency loses these functions in its country, the state's monetary sovereignty could be questioned.

Another threat to the TL in the digital era is another CBDC that could be used across borders without any restriction (IMF Staff Report, 2020, p. 22; Landau, 2021, p. 15). Especially CBDCs belonging to developed countries is a more serious threat to the Turkish economy in terms of currency substitution since hoarding foreign currencies belonging to a developed currency area is a habit for Turkish people (T.C. Cumhurbaşkanlığı Finans Ofisi, 2021, p. 35). With the introduction of CBDCs, hoarding foreign currencies for saving purposes may be much easier and more uncontrollable (Visa, 2022, p. 20; Carstens, 2021, p. 13). In order to avoid this undesirable consequence, the store of value function of TL should be significantly ramped up.

Describing the Potential Characteristics of the DTL

Current Situation of the DTL

Türkiye, like many other countries, is planning to implement a CBDC. The CBDC plan of the country has been announced in official government plans. The 2022-24 Medium Term Government Plan, published in 2021, stressed that the advanced pilot tests of the DTL would be conducted in the 2022-24 term. The 2023 Annual Program of the Presidency has declared that the payment pilot of the DTL would be conducted in 2023. In addition, the integration process of the DTL, the FAST payment system, and the digital identities will be completed in 2023. Lastly, tests, research, and development of a wholesale CBDC will be conducted with banks in 2023. In other words, there is a general-purpose CBDC plan and a wholesale CBDC plan in Türkiye.

In July 2021, the Governor of the CBRT announced they would begin a pilot test in September 2021 (MYNET Haber, 2021). In September 2021, the CBRT made a press release and gave important information about the DTL project. First, it cooperated with ASELSAN, HAVELSAN, and TÜBİTAK-BİLGEM, which are state-owned technology firms and agencies, for the DTL project. Secondly, it will begin pilot tests. Through pilot tests implemented with stakeholders scalability, integration, and payment system capability of new technologies, such as blockchain and distributed ledger, would be evaluated. Lastly, the CBRT stressed that the final decision about the DTL had not been made yet. Through the project, the economic, fiscal, and legal implications of the DTL would be investigated (TCMB, 2021). In the 2021 Annual Report, the Bank stated the pilot tests of both general purpose and wholesale

projects were continuing, recent developments relating to CBDCs were monitored, and it had meetings with other central banks about CBDC projects (TCMB, 2021, p. 63). In December 2022, the CBRT announced the pilot tests had been completed successfully and would continue. In 2023 legal and economic aspects of the project would be prioritized (TCMB, 2022). These comments and reports indicate that implementing the CBDC in the Turkish financial system is highly possible. It is crucial to construct it with the needs of the Turkish economy in mind. The Turkish economy can benefit greatly from the DTL if the DTL project is carried out in a proper manner.

Recommendations for the DTL

It is crucial to design the DTL regarding scalability, payment systems and interoperability with other financial systems. There are many opportunities with the DTL, not only for the Turkish financial system but also for the tax system. First, the DTL could make obsolete cash in Türkiye, which is crucial for diminishing the informal sector. The DTL's offline capability is indispensable to abolish cash usage in case of a failure of the online system or a power cut. The offline capability of CBDC is "the make-or-break feature" for many regions of the importance of cash usage and the population deprive of internet connection. Special cards or offline digital wallets operated by smartphones could be used with near-field communication technologies or authorization codes (Kiff, 2022).

In Türkiye, both special cards and offline digital wallets should be used for ease of use. Since there are many people in Turkish society not using smartphones. 23% of the Turkish population did not have smartphones in 2020 (Taşçı, 2020). Special cards are the most convenient means of payment in the absence of cash for them. On the other hand, offline digital wallets are the most convenient for smartphone users. Devices having near-field communication technology should be used at shops. When it comes to money transfers between individuals, authorization codes and QR codes could be used. Thanks to the intermediary model, offline operability could be developed by private intermediaries. There is also such an initiative from Visa, a foremost financial institution in the world (Christodorescu, ve diğerleri, 2020, p. 5-7). Similar initiatives could be developed by Turkish private financial institutions.

Thanks to the abolishment of cash, all citizens have a sole and integrated account to make or receive payments. Recording all payments digitally on the ledger makes concealing any financial activity from the Revenue Administration impossible. It was declared in the 2023 Annual Program of the Presidency that the DTL would cooperate with digital identities, which ensures the record of all financial activities of any person for fiscal purposes. Conversely, this recording may give rise to privacy concerns among individuals. For this reason, the financial information of individuals should be used solely for fiscal purposes. Government agencies should be regulated with privacy concerns in mind. The European Central Bank (ECB) prioritizes the privacy issues of the digital euro project since privacy emerged as the main concern for 43% of respondents in the public consultation conducted by the ECB in 2020. Full anonymity is not an option for the ECB due to the potential illicit users. Users will have to identify themselves before using the digital euro. Transaction surveillance will be conducted by intermediaries. The data from this surveillance will remain at the intermediaries and be used for anti-money laundering (AML) and combating the financing of terrorism (CFT) requirements. Intermediaries will share data based on a related regulation or digital euro related tasks. When it comes to low-value transactions, some cash-like anonymity features will be granted to users based on risk assessments. (ECB, 2022, p. 6-8). This model could also be used for the DTL.

A CBDC system could be implemented with intermediaries or directly by central banks and could be account-based or token-based. The account-based system with intermediaries resembles contemporary bank accounts in which payments and settlements are approved by banks by controlling the rights of the sender and recipient accounts. This system is more convenient than the token-based one (Auer, ve diğerleri, 2021, p. 11; Carstens, 2021, p. 13). Thanks to intermediaries (generally banks) and account basing AML and CFT requirements could be easily done without giving the burden on the Central Bank since banks have a huge experience in doing it. In addition, banks have a significant experience in customer service. They could easily produce a system for offline payments and online settlements thanks to the competition incentive (The Office of Science and Technology Policy, 2022, p. 13, 14). Exposing the Central Banks directly to customer services engenders uncertain

risks since it has not faced customers directly; even cash distribution task is done by banks, which is the liability of the Central Bank. What is more, the account-based system is more convenient for resolving tax compliance issues. Thanks to certain account holders, all transaction histories in the economy could be easily specified by tax authorities giving them to easily spot the tax incompliance (Deutsche Bank Wealth Management, 2020, p. 9). On the other hand, a token-based system and direct implementation by the Central Bank is not a favorable choice since they lack the advantages of an account-based system with the intermediary model (Auer, ve diğerleri, 2021, p. 14). The sole advantage of a token-based system may be privacy since token-based systems resemble cash in terms of circulation. But some privacy could be ensured in an account-based system to allay the concerns of sensitive users, as in the digital euro project (ECB, 2022, p. 6-8).

An account-based system with intermediaries could easily ensure to carry out interest rates on the CBDC system. Banks can make paying interest for CBDC easy because they have experience in paying interest for deposits (Bossu, ve diğerleri, 2020, p. 37). The Central Bank decides the rate of interest, and banks could implement this interest. The Central Bank could eliminate the effective lower-bound limit if it wants to stimulate the economy on the condition that cash becomes obsolete. In addition, it could directly steer the economy without relying upon banks to transmit the policy it has decided (Deutsche Bank Wealth Management, 2020, p. 6).

Banks also can carry out smart contracts for their customers, thanks to the competition incentive. By using smart contracts, helicopter money could be used for various purposes including incentivizing specific sectors and encouraging spending (Fan, 2021, p. 10).

Giving many tasks to banks in a CBDC system may raise some hesitancy. However, they could reinforce their position in the new financial structure constructed with the beginning of CBDCs employing those tasks. They might gain more thanks to those tasks also. As a result, they benefit from new tasks instead of feeling new burdens due to those tasks. It could be also possible that everyone can choose between intermediaries and the Central Bank as a service provider. If they choose to hold reserves in the Central Bank, they have the trust of central bank liability. If they choose to hold reserves in

commercial banks, they have the convenience of private banking experience. In the second choice, the CBDC may resemble the synthetic CBDC concept (Auer, Cornelli, & Frost, *Rise of the central bank digital currencies: drivers, approaches and technologies*, 2020, p. 18; Visa, 2022, p. 14).

The effect of CBDCs on the seigniorage depends on the design of them. Today, seigniorage income are shared by the Central Bank and other banks due to the fractional reserve banking. If the DTL is more attractive than today's demand deposits, the income of the central bank from seigniorage could increase and vice versa (Committee on Payments and Market Infrastructures, 2018, p. 26). The Central Bank could wield interest rates to change the attractiveness of the DTL for stabilization of bank (Group of Central Banks, 2020, p. 11; IMF Staff Report, 2020, p. 22; Federal Reserve, 2022, p. 17; Labonte & Nelson, 2022, p. 28; Carstens, 2021, p. 10). It could impose a limit for the DTL if it is needed for banks' balance sheet necessities (Deutsche Bank Wealth Management, 2020, p. 7).

Incentivizing the Abandonment of Cash Usage

If it is impossible to abolish cash usage for various reasons, a special tax for cash usage could be laid. "The Informal Economy Tax" could be collected through withholding by banks. The rationale for the tax can be the internalisation of negative externalities like the plastic bag tax which has been in practice since the beginning of 2019 in Türkiye (Tabar, 2021). Cash users should pay for the negative consequences of cash usage on the economy since they support the informal sector. In this scenario, wages, salaries, retirement pensions, and others should be paid through the DTL. If people request cash from their bank, the bank could withhold the allowed percentage of the suggested tax and send it to the state. In this way, tax loss from the informal economy may be partly compensated. Besides, individuals tend to alter their cash usage habits, helping reduce the informal economy. Decreasing the cash usage may direct some shops to cease accepting cash as a means of payment, which also hastens the disappearance of cash (Gnan & Masciandaro, 2018, p. 14).

A new tax could be seen as a heavy burden on Turkish taxpayers. If the government does not want to levy new tax on citizens, it should incentivize the usage of the DTL by other means. For example, a special tax cut could be given for those who do not request cash from the bank.

Free museum visits could also be granted for them. Other methods resemble these examples for incentivizing the use of DTL could be laid out to minimize cash usage in daily transactions.

CONCLUSIONS

The transition to digital payment methods marks a turning point for money. Private digital currencies and crypto assets paved the way for digitalization in daily transactions and saving instruments. Sovereign states are in danger of weakening monopolies in monetary system. In reply to this threat, states commenced researching CBDCs to change the form of sovereign currencies. Developed countries have a fully-fledged financial system that provides more reliable means of payments for their citizens than emerging countries, in which citizens easily adopt new means of payments and store of values other than domestic fiat currencies. Therefore, emerging states are in danger of weakening monetary sovereignty over their territory more than developed states due to the new digital payment instruments and other digital fiat currencies circulating across borders without any restriction.

Türkiye is not immune from this threat. Therefore, the DTL project is of paramount importance for the monetary system. The DTL could help responsible authorities for preventing currency substitution. Thanks to the practical digital form of TL with stable value, Turkish society will not prefer to use any medium of exchange and store of value apart from the TL. Besides, by using the DTL, responsible authorities could improve the ability of the CBRT to steer the economy and minimize the informal economy by making obsolete cash.

Fading the informal sector ensures increased tax revenues, reducing tax rates and stepping up life standards in the country. In addition, it will end the suffering of honest taxpayers due to the injustice of the tax system resulting from the informal economy. Therefore, it is crucial to use the DTL to make cash obsolete, which is crucial for battling with the informal economy. However, digital data of personal transactions should be stored with privacy concerns in mind. Otherwise, Turkish society will go towards using crypto assets as a medium of exchange owing to their pseudo-anonymous characters.

In this work, it has been reached that the end of the importance of the DTL project in the wiping out of the

informal economy in **Türkiye** thanks to its capacity to diminish cash usage. In addition, the project carries weight with the possibility of currency substitution coming from a digital currency of a developed country or from private digital currencies and decentralized systems. This goal can only be achieved with a TL that possesses a stable value.

The DTL project has of paramount importance in preserving monetary sovereignty and increasing the tax fairness of the country. In the digital era of the economy, a digital central bank liability, which is reliable systematically and legally, is an essential part of the robust centralized monetary system. An account-based CBDC with offline capability, controlled by the CBRT in collaboration with private banks, and respectful of personal data could be a possible design.

There are a lot of policy considerations relating to the DTL project which cannot be sufficiently evaluated in this article. Hence, it is important to research the DTL's scalability, privacy, monetary policy, and operational issues before rolling it out. The CBRT should contact academics, other central banks, and private payment intermediaries like banks to make the project fully fledged.

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