Don't Break the Bank:
Economic Considerations and Design Implications for a Central Bank Digital Currency

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Introduction

Advances in technology allow us to buy and sell goods and services at the touch of a button, transfer money from one part of the world to another in seconds, and pay for purchases with our phones instead of with cash or bank cards. Digitalisation has radically changed the manner in which households and businesses interact with the financial system and complete everyday transactions.

A major implication of these advances has been the decline in the use of physical cash as a form of payment. According to the European Central Bank (ECB), the share of cash transactions at the point of sale as a proportion of all transactions declined by 14% in Ireland from 2019 to 2022. This downward trend was replicated across the euro area over the same period.[1]

Why is Cash Important?

Many of us now pay for goods and services by using a digital wallet on which debit or credit card information is contained, often by tapping a card machine with a mobile phone. In reality, the money that we spend in this way is what is referred to as commercial bank money. Commercial bank money provides us, the consumer or business, with a claim on central bank money up to the value of the money that is in our accounts in addition to the amount of the overdraft that is permitted.

Currently, the only form of central bank money that citizens can hold is cash. One can obtain central bank money by going to an ATM or bank and withdrawing cash, which converts the commercial bank money that a person holds into central bank money. As this paper will explore, holding commercial bank money is not risk-free in the same way as holding central bank money (i.e. cash) is.

As a result, it follows that the decline in the use of cash across the euro area embeds a risk to financial stability in the absence of an adequate risk-free alternative. This is particularly the case given the absence of a European Deposit Insurance Scheme, which empirical studies have shown would considerably improve liquidity support for depositors in the event of a financial crisis in the banking sector[2] and would provide greater protections for consumer deposits.[3]

The Unsuitability of Cryptoassets as a Replacement for Cash

In recent years, new forms of digital assets such as cryptocurrencies, stablecoins[4], and other forms of decentralised finance have exploded in popularity. In theory, these forms of finance are "decentralised" meaning that no single entity, such as a central bank, has control over their supply.[5]

Within its technical definition, money is considered to have three characteristics: it is a means of exchange, a store of value, and a unit of account. Given the volatility that has been witnessed broadly in markets for cryptocurrencies, it is difficult to see how Bitcoin, and Ether, and other popular variations of cryptocurrency can satisfy the criteria of being categorised as money. As such, digital currencies can, and have been, referred to more accurately as "cryptoassets", due to their more widespread use as investments by consumers, businesses, and financial institutions.

1. https://www.ecb.europa.eu/stats/ecb_surveys/space/html/ecb.spacereport202212~783ffdf46e.en.html#toc9
2. See for example the following technical report of April 2023 from the Joint Research Centre of the European Commission: https://publications.jrc.ec.europa.eu/repository/handle/JRC132364
3. A longstanding debate at EU level, which has been ongoing since the global financial crisis and the Eurozone sovereign debt crisis, surrounding the creation of a European Deposit Insurance Scheme (EDIS) which would insure depositors at the European level and reduce the risk of a damaging sovereign-bank nexus in the event of a future financial crisis has thus far, failed to garner agreement amongst the 27 Member States.
4. This is a digital asset, the value of which is pegged to another asset, such as another currency or cryptoasset.
5 . In practice this is not always the case, as some cryptocurrencies are launched and managed by centralised entities, and this can come with significant centralisation risks. However, discussion of this is beyond the scope of this paper.

Due to the fast-moving and disruptive nature of these technological developments, cryptoassets have not been as tightly regulated as other forms of finance are, as regulators have struggled to keep up with technological developments and get to grips with their potential impact on the monetary and financial system.

For these reasons, the widespread adoption of cryptoassets as a form of digital money could embed a financial stability risk within economies,[6] which has forced central banks throughout the world to consider the role they can play in counteracting and protecting against such risks.

Towards a Central Bank Digital Currency?

In response to these developments, and to provide an alternative to privately-issued forms of digital currency, more than 100 central banks throughout the world are currently exploring the creation of a central bank digital currency (CBDC).[7]

A CBDC is a form of digital currency that is issued by a central bank rather than a commercial bank. A retail CBDC would seek to replicate the access that commercial banks have to central bank money and would allow citizens to hold their money directly with the central bank rather than with a commercial bank.

A CBDC would likely use similar technology to that used for cryptocurrencies, potentially including distributed ledger technology (DLT). DLT creates a permanent, immutable electronic record of transactions which sits on what is known as a blockchain. However, the nature of CBDCs implies that there would be key conceptual differences between them and cryptocurrencies, for example the inherently centralised nature of CBDC governance and the end-user expectation that their transactions would not be visible to the public, as is the case for most DLT-based cryptocurrencies. CBDCs might also use more traditional database technologies, for reasons of speed, scale, and privacy.

In theory, a CBDC provides some interesting, previously unfathomable, and at times, unsettling possibilities for policymakers. One could consider that in times of crisis, such as during the COVID-19 crisis, central banks could distribute direct monetary stimulus to citizens (i.e. so-called "helicopter money") which could be received instantly in citizens' accounts held at the central bank.

The central bank could even, in theory, programme this money so that it could only be spent on certain types of items such as, for example, grocery shopping, medicines, utilities, or other essential items. Thus, governments that were so minded could theoretically prevent citizens from spending money held at the central bank on goods and services that they viewed as undesirable. On the one hand, protections against anti-money laundering or other forms of criminal activity could be greatly enhanced, but one could also consider the possibility of more interventionist governments heavily regulating activities they viewed as undesirable, such as excessive alcohol consumption, drugs, gambling, or activities that produce excessive carbon emissions.

Though some of these examples would be unlikely to come to pass, it is nonetheless easy to understand how, given the potential economic and social policy consequences of such a fundamental change to how citizens interact with the financial system, a considered approach to the design, implementation and regulation of any CBDC is required by central banks throughout the world.

6. See here a European Central Bank paper from May 2022 which addresses financial stability risks in the euro area arising from crypto-asset markets: https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205_02~1c-c6b111b4.en.html

7. The Atlantic Council have produced a tracker which monitors the progress of the development of CBDCs in countries and currency unions throughout the world: https://www.atlanticcouncil.org/cbdctracker/

This following section particularly addresses some of the economic, and in particular, macroprudential issues arising from the future development of CBDCs, and how to ensure that the effects of these issues are mitigated.

Protecting the Financial System

This section returns to the argument that holding commercial bank money should not be considered as 'risk-free' and examines it in more detail, while assessing the implications of this for new CBDCs.

Taking the example of the euro area, under current EU legislation, governments are required to establish deposit guarantee schemes (DGS) to protect depositors in the event of a bank failure. At present, depositors' savings are guaranteed at the national level up to a value of €100,000.[8]

Compare this to holding physical cash in the event of a bank failure. Assuming that one's physical cash will not be lost or stolen, one would retain the full value of the cash as opposed to only being entitled to a claim on physical cash up to the value of €100,000 had they deposited it at the failing commercial bank. To compensate for this risk, deposits with a commercial bank typically[9] command a positive interest rate while cash, by its nature, commands a 0% interest rate.

In theory, the creation of a new retail CBDC for the euro area, or a 'digital euro', would allow depositors to hold deposits directly with the ECB as opposed to with a commercial bank. Thus, in the event of a financial crisis, the ECB has the capacity to simply create more digital money in what could be seen as a form of quantitative easing (QE) to protect deposits held at the ECB. It would follow that if a digital euro were to replicate the characteristics of a physical euro, with one digital euro being of equal value to one physical euro, that the ECB should be willing to utilise this capacity in the event of a crisis to protect digital euro deposits.

Nonetheless, holding digital euro deposits with the ECB as opposed to holding physical cash would create certain advantages, such as the fact that the money would not be lost or stolen while it is stored or used for transactions, as well as its ease of use for transactions, such as online transactions, as well as remittances.

For these reasons, in the case of the introduction of a digital euro, the potential arises that deposits may be moved by households and businesses from commercial bank accounts to ECB accounts. One could particularly envisage this being the case for those with large deposits or more risk-averse households and businesses. An ECB research paper published in May 2022 found that as little as 0.5% or as much as 18% of aggregate euro area bank liabilities could be substituted away from deposits in different scenarios of hypothetical designs and levels of adoption of a digital euro.[10]

Given that commercial banks use deposits to facilitate lending, a reduction in the number of deposits held with commercial banks would lead to more expensive lending, as commercial banks would then be forced to raise their interest rates. This would create concerns regarding both the availability of new cheap credit and credit risk on existing lending in the economy.

Similarly, there would exist a heightened potential of bank runs occurring during a systemic crisis in the banking system. If the financial system were to face a crisis on a similar scale to that of 2008, one could envisage households and businesses rushing to convert their commercial bank deposits to central bank deposits, to avail of the 'risk-free' nature of central bank money.

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8. https://finance.ec.europa.eu/banking/banking-regulation/deposit-guarantee-schemes_en
9. This is not always the case and can depend, amongst other factors, on interest rates set by the ECB. Indeed, from June 2014 to July 2022, the interest rate on the deposit facility which commercial banks use to make overnight deposits with the Eurosystem was negative: https://www.ecb.europa.eu/stats/policy_and_exchange_rates/key_ecb_interest_rates/html/index.en.html
10. https://op.europa.eu/en/publication-detail/-/publication/802c8bab-fcd1-11ec-b94a-01aa75ed71a1/language-en/format-PDF

Therefore, a prudent design of a CBDC should design effective guardrails that protect against the disintermediation of banks and from bank runs. One option to achieve this is to impose a limit on the amount of CBDC that can be held by depositors. This would effectively compel depositors to hold excess savings above the imposed limit with commercial banks or other financial institutions such as fintechs, or decentralised finance companies, or indeed, in cash. As such, whilst also protecting against disintermediation and bank runs, it would also buttress the essential role of cash within economies and societies, including as a means of access to finance for the unbanked and underbanked.

The same ECB study found that, in the case of the euro area, for every €1,000 increase in the holding limit of CBDC, the substitution away from households' euro-denominated overnight deposits would be €340 billion, or 7% of the total stock of households' euro-denominated overnight deposits.[11] Equally, a holding limit that is too low would disincentivise the adoption and use of CBDC, and could confine its use case largely to retail transactions. Given the presence of companies such as Revolut, which already provide a similar, low-cost service in the developed world, the use case of a CBDC designed with a low holding limit for citizens in high-income countries is more difficult to ascertain.

Article 16 of the European Commission's proposal for Regulation on the establishment of a digital euro enshrines a role for the ECB in setting the appropriate holding limit of a digital euro, and other safeguards to limit the digital euro's use as a store of value.[12] Fabio Panetta, Executive Board Member of the ECB, who currently leads the ECB's work on a digital euro at Board level, suggested in an interview in 2021 that €3,000 could be an appropriate holding limit for a digital euro.[13]

In the design of a new CBDC, implementing a holding limit which is both proportionate and responsive to the economic conditions of the jurisdiction is a critical means of safeguarding financial stability, maintaining the essential role of banks within the financial system, supporting innovation in the financial system, and ensuring that cash remains available to citizens and businesses as a means of exchange and store of value.

Conclusion: Finding the Appropriate Balance

CBDCs have the potential to provide for a number of important benefits for the euro area, and other economies throughout the world if designed appropriately and widely adopted.

In addition to providing a low-cost, secure, and centralised[14] form of money that exists as a digital complement to cash, CBDCs could also allow for other potential benefits with more widespread global applications.

While central banks such as the ECB and the Federal Reserve may consider economic issues such as the role of cash within societies and bank intermediation in their decision on whether to issue a CBDC, emerging market, developing, and low-income countries could benefit in several important ways by introducing a CBDC.

An appropriately designed CBDC could provide citizens in these countries with the opportunity to gain access to the financial system and promote greater financial inclusion. By designing a CBDC that facilitates offline payments and does not require the ownership of a commercial bank account, citizens in such countries would have the potential to access a digital form of money with all its associated uses, without the requirement to have access to the internet and without the onerous requirements that often come with setting up a bank account.

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11. Ibid.
12. https://eur-lex.europa.eu/resource.html?uri=cellar:6f2f669f-1686-11ee-806b-01aa75ed71a1.0001.02/DOC_1&format=PDF
13. https://www.bloomberg.com/news/articles/2021-02-09/ecb-s-panetta-floats-3-000-euro-limit-on-digital-cash-spiegel
14 I.e. the supply of money is controlled by the central bank.

Given the 'risk-free' nature of a CBDC stored with the central bank, another potential benefit for these countries could come in the form of low-cost remittances, which could be further facilitated across borders in the case of interoperable CBDCs across jurisdictions.

As was highlighted in a recent IIEA webinar by Christopher Calabia, Head of CBDC Programs at the Massachusetts Institute of Technology (MIT) Digital Currency Initiative, governments with large official development assistance (ODA) contributions, such as Ireland, could also consider the use of CBDCs as a way to ensure that foreign aid reaches recipients in target countries without incurring high fees or being subject to inefficiencies in the global payments infrastructure.[15]

Nonetheless, for developed economies and currency unions such as the euro area, a compelling use case for a CBDC will be required to incentivise widespread adoption. With banks and other financial institutions facilitating both deposits and borrowing at competitive rates, companies such as Revolut providing low-cost payment services and the expedient transfer of money, and other cryptocurrencies and stablecoins used as both investments and to guarantee the privacy of transactions, central banks will have to decide what clear value proposition their CBDC will offer that is more attractive to consumers, businesses and governments than these available alternatives.

Failure to answer this essential question creates a risk that central banks in the developed world fail to design a CBDC that meets the challenges posed by the decline in the use of cash, the potential weakening of the monetary policy transmission mechanism, and financial stability risks posed by the widespread adoption of volatile cryptocurrencies.

Yet, within developed economies, central banks which design a CBDC that seeks to address one or several of the issues outlined in this paper should counterbalance this with incentivising innovation in the private sector, safeguarding the important role of banks and other financial institutions within the economy by protecting intermediation, and protecting the individual freedoms and privacy of citizens.

Given the fundamental change the introduction of CBDCs would entail for the financial system and how the world interacts with it, the future of finance, and citizens' trust in both it and their governments, will depend on how these important decisions are made.

15. https://www.youtube.com/watch?v=VOXg_0sHCbo

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