MASTER IN MANAGEMENT (MIM)

MASTERS FINAL WORK

DISSERTATION

THE FUTURE OF MONEY:

AN ANALYSIS OF THE OPTIONS FOR CENTRAL BANKS IN THE DIGITAL ERA

KEVIN EMIL DUINDAM

MARCH - 2023

Lisbon School of Economics & Management
Universidade de Lisboa

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The Future of Money: An Analysis of the Options for Central Banks in the Digital Era

GLOSSARY

AML – Anti Money Laundering

CBDC – Central Bank Digital Currency

DLT – Distributed Ledger Technology

KYC – Know Your Customer

IPS – Instant Payment System

SDG – Sustainable Development Goal

ABSTRACT, KEYWORDS AND JEL CODES

The research in this thesis focuses on the current outlook for the future of money, what options are available and how these can be evaluated. Regarding the current options for central banks, the research revealed that two relatively similar options are to choose from; a Central Bank Issued Digital Currency (CBDC), essentially a digital version of cash, and a modern, robust Instant Payment System (IPS), for most countries upgrading our payments infrastructure. Both come with different advantages, while CBDCs provide more potential stability as it allows ongoing access to central bank money, an IPS proves successful in its ability to utilise existing infrastructure, showing relatively high levels of acceptance in countries around the world.

Significant challenges found during the research for CBDC or IPS issuance were that trust in government (or a similar issuing entity) must be high while simultaneously there being no existing and therefore competing robust instant payment system within the jurisdiction. These two challenges would lead to a lack of incentive to adopt a new system of payments for the average user and have other negative network effects. Furthermore, the research has shown that clarification if an IPS will indirectly be capable of providing the necessary stability to ensure the coherence of a domestic system, especially if cash is no longer used and there is no alternative access to central bank money. However, experts agreed that this scenario has never happened before to a large functioning economy in the modern area and is difficult to predict, with Sweden likely being the first to experience this effect first-hand.

Finally, the research has shown that acceptance of any newly issued CBDC or IPS will only reach sustainable levels if the interface is easy to use by all, fulfils user needs, and the onboarding has been marketed well with all key stakeholders and retailers on board. This thesis proves to serve as guidance, with limitations and should contribute to the ongoing research about the future of money.

Keywords: SDG Goals, CBDCs, Currency, Central Banks, Payment Systems, Money

JEL Codes: E41, E42, E50, E58, O33, G21

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1. INTRODUCTION

With the rise of technology and digitalisation, the topic surrounding the future of money has received much attention within the last decade. Globally, the two main payment infrastructures currently being researched, developed, and launched are Central Bank Digital Currencies (CBDCs) and a modern type of Instant Payment System (IPS). Not every IPS or CBDC system is designed the same, with each different system varying in levels of functions and capabilities. However, a IPS and CBDC are extremely similar if settled through the central bank (Humphrey & Khiaonarong, 2022). As seen below in Table 1, an overview of the potential applications each system can have. The key difference is that a CBDC is central bank money, being a direct claim against the central bank rather than on an intermediary (Duarte et al., 2022). Differences can be associated to money related such as being legal tender or payments related, which is the processing infrastructure or interoperability (Morales-Resendiz et al., 2021).

Table 1 – A comparison between potential robust IPS and CBDCs

	IPS	CBDC
Processing Infrastructure	Yes	Yes
User interface	Yes	Yes
24/7 Accessibility	Yes	Yes
Privacy Features	Yes	Yes
Potential for Offline Features	Yes	Yes
Option to be Central Bank Settled	Yes	Yes
Legal Tender (Central Bank Money)	No	Yes

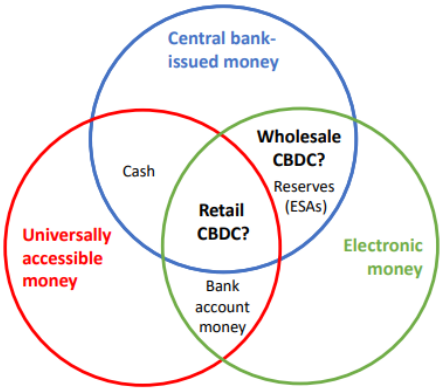
Source: created by author based on Humphrey & Khiaonarong, (2022); Duarte et al. (2022); and Morales-Residendiz et al., (2021)

The topic surrounding the future of money has been on the agenda by almost every country in the world, as multiple industries and governments are catching up to the wave of digitalisation. This thesis looks at analysing the reasoning behind updating our monetary system, the needs and wants of the public regarding money and if any recommendations can be given to central banks around the world. Before research begins, background will be given first about CBDCs and then IPS to provide context to introduce the main concepts for first-time readers.

A brief introduction to Central Bank Digital Currencies

Today, central banks issue physical cash and electronic central bank deposits/reserves (BIS, 2020). Below in Figure 1, we can see the circles showing the instruments of cash, electronic bank account money and then also reserves. The general trend of thought has been to encompass all of the areas into one Central Bank Issued Digital Currency (CBDC), as seen in the middle: a Retail CBDC. Although we experience currency similarly depending on the country we are in, a CBDC, on the other hand, could be drastically different depending on the jurisdictions needs and wants.

Figure 1 – Potential Future Outlook of Money



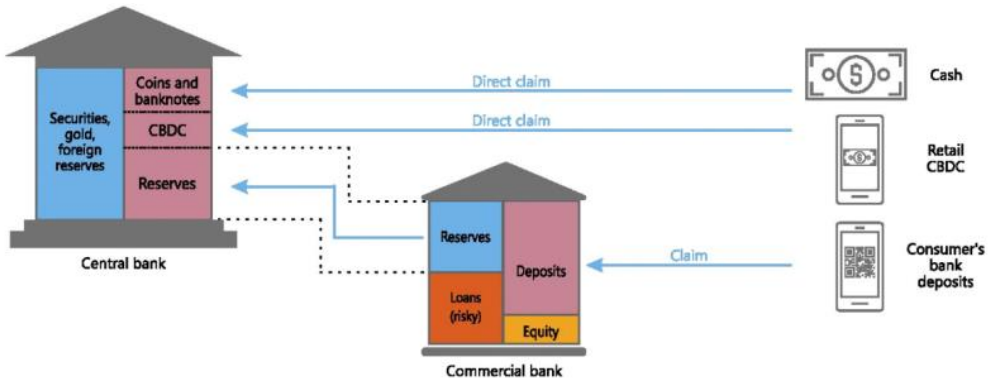
Source: (Dark et al., 2020, p. 33)

Since 2016, proof of concept testing of the feasibility for achieving specific technological outcomes has been at the forefront of CBDC research (BIS, 2020). An "improved understanding of the capabilities of current technologies" was deemed as key to understanding limits or trade-offs during policy implementation (BIS, 2020, p. 16). In a joint statement put out with the Reserve Bank of Australia, Dr. Andreas Furche, CEO of the Digital Finance Cooperative Research Centre (DFCRC), was quoted as saying a "CBDC is no longer a question of technological feasibility. The key research questions now are what economic benefits a CBDC could enable, and how it could be designed to maximise those benefits" (RBA, 2022). This can be reflected well throughout the magnitude of the research in overview at the Atlantic Council (2023) with testing occurring at nearly every major central bank, but also technology-focused initiatives such as 'opencbdc', which is a digital currency initiative by MIT (2023).

A CBDC is defined as a "digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank" as explained by the BIS (2020).

Issuing a CBDC would essentially change the function of the central bank, providing it with a "new role" in the monetary system (BIS, 2021). Central Banks would be given more control as direct payment providers, serving as a store of value instead of using intermediaries, implying new responsibilities to protect the data being used in the system (BIS, 2021). This suggests risks of competition and substitution away from private money in the literature while simultaneously been regarded as having no negative impact in terms of financial stability (BIS, 2021, p. 6). Furthermore, in contrast to today's electronic money, the claim is represented on an intermediary like a commercial bank as seen below in Figure 2 by Auer & Böhme (2021).

Figure 2 – Cash, electronic payment instruments, and retail CBDC

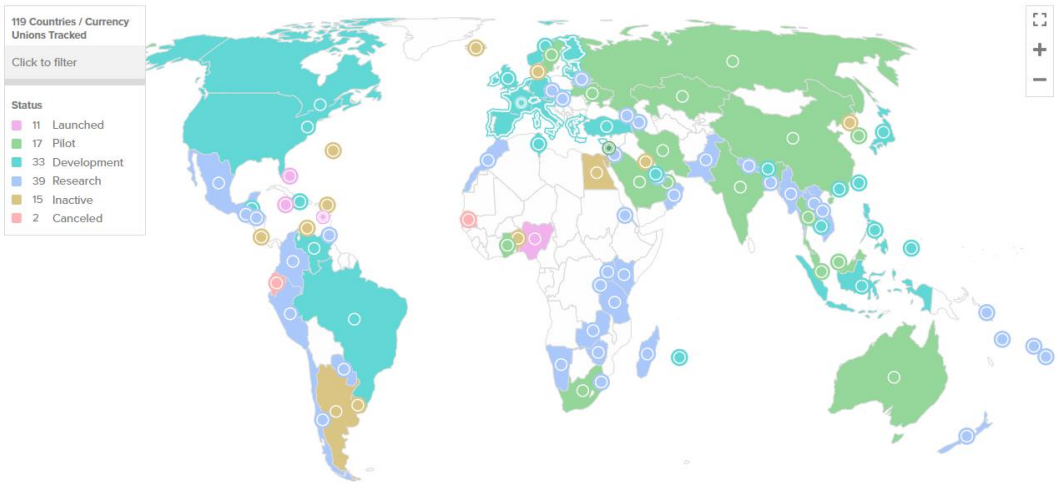


Source: (Auer & Böhme, 2021)

To illustrate the impact worldwide, an overview about the global CBDC development from the Atlantic Council (2023) below in Figure 3 can be seen. At the time of writing, 114 countries representing over 95% of global GDP are at different stages of CBDC exploration (Atlantic Council, 2023). 11 Countries have launched, and China's Pilot which is currently available to 260 million people, is set to expand to most of the country by this year (Atlantic Council, 2023). In 2023 alone, over 20 countries will continue or begin testing CBDCs which include Australia, Thailand, Brazil and India (Atlantic Council, 2023).

As mentioned, CBDCs are being investigated for different purposes depending on the needs of that jurisdiction. The main types of CBDCs are direct, indirect and hybrid, which differ on the level of involvement existing intermediaries will have (Auer & Böhme, 2021). For a more precise understanding, please refer to Appendix 3 for more information (Auer & Böhme, 2021).

Figure 3 – Overview of Global CBDC Development



Source: (Atlantic Council, 2023)

Decisions about the type of CBDC to develop above can differ, as each jurisdiction has different needs, however, other current research investigates the type of architecture for issuance or utilising different underlying technology using either conventional or distributed ledger technology (Atlantic Council, 2023). This involves possible systems where payments run either directly or indirectly through intermediaries in a single- or two-tier system (Auer & Böhme, 2021). Each variant of CBDC provides specific benefits and challenges ranging from technology, the underlying infrastructure needed, legal barriers, social implications, control, regulation and the potential impact it could have on existing systems and intermediaries (Auer & Böhme, 2021).

Regarding CBDCs, this research will focus on the most widely researched retail CBDC which is the most basic model as described by Eichengreen et al. (2022). It is considered safe central bank money, easy to use for transactions, universally accepted and would not require the merchant to have a connection to other banks or intermediaries, as it would be direct to the central bank (Eichengreen et al., 2022). Transactions would hypothetically also cost less due to the intermediaries' falling away for services such as KYC, AML, or overdraft protection (Eichengreen et al., 2022).

A brief overview of Instant Payment Systems

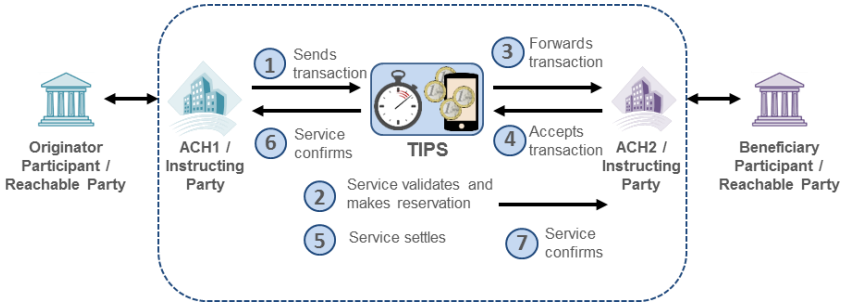
Instant Payment Systems, also interchangeable with 'Fast Payments Systems' or 'Immediate Payments Systems', are described by the World Bank (2021) as payments that occur in real-time, 24/7 hours a day as possible. There are also payment service

providers (PSPs) that utilise the underlying system of an Instant Payment System (World Bank, 2021), although more modern systems are combing both. The widely used real-time gross settlement (RTGS) system already gives the option to credit in real-time, however, most cannot execute real-time payment as this depends on the technical interface between intermediaries (World Bank, 2021). Instant Payment Systems improve overall market efficiencies and boost economic growth by allowing the transfer of money to occur in seconds rather than days (ACI, 2022, p. 3).

In the USA, the Real-Time Payments environment remains largely untapped, according to ACI (2022, p. 16). The world's largest and most wealthy economies usage in 2021 remained at less than 1% of total transaction volumes (ACI, 2022, p. 16). According to ACI (2022, p. 83), instant payments features include: Immediate availability of funds to the beneficiary of a transaction, irrevocability, meaning the sender cannot deauthorize the transfer, confirmation of funds via real-time balance, settlement within a matter of seconds. 'Digital Overlay Services' are then front-end touchpoints to a purchasing experience, such as google pay, apple pay as an extension of the physical card with a bank account linked to it (ACI, 2022, p. 83).

Below in Figure 4, an example of an Instant Payment System TIPS can be seen, which is a model aimed at improving pan-European settlement of central bank money (Visco, 2020). Within the dotted lines, the system itself centralises the processes listed in the figure without needing other intermediaries to process, validate, accept, settle and transact between two participants (Towning, 2020). Comparable successful systems centralise many steps, making settlement more direct without the need of other intermediaries (Visco, 2020). To compare, a CBDC would also include the participant's wallets directly within the system, eliminating the need for a bank account.

Figure 4 – Example of Instant Payment System 'TIPS'



Source: (Towning, 2020)

1.1. Motivation

Central banks themselves have a mandate for monetary and financial stability, promoting safe and efficient payments within their jurisdiction (BIS, 2020). Cash or paper money acts, therefore as a i) means of payment, ii) unit of account and iii) store of value, which represent the three functions money must have (Spooner, 1978). Until recently, many central banks' public policy objectives have remained unchanged for the last hundred years (BIS, 2020). A CBDC could become the newest form of money in the evolution of Central Banks, with the growing trend to issue a CBDC in the medium term becoming more and more likely as each year passes (Kosse & Mattei, 2022).

The initial motivation for this thesis came from renowned monetary policy Professor Barry Eichengreen after he touted a CBDC: "A solution in search for a problem" (Eichengreen, 2022). The article questioned what economic and social problems a CBDC could solve that could not be solved by existing means (Eichengreen, 2022). To challenge the narrative of the positive aspects a CBDC could offer, Eichengreen et al. (2022) compared the launch of the CBDC in India to the existing system, namely the Unified Payments Interface (UPI), which is operated by a non-profit subsidiary of the Central Bank, enabling India already to have an efficient, low-cost real-time payment system. Eichengreen (2022), within the article, highlighted that from the perspective of financial inclusion and ease of payment, private payment systems "such as M-Pesa have already gone a long way toward solving this problem", making CBDC redundant by design. In another paper, Eichengreen et al. (2022) mention that further CBDC arguments have been advanced uncritically, failing to acknowledge that some goals can be achieved at lower cost and less risk.

The success of an IPS or CBDC are commonly measured by adoption and, therefore, acceptance by the general public (Denecker et al., 2022). Although most CBDC launches so far are too new to assess fully, early adoption has shown to be low (Denecker et al., 2022). This can occur for several reasons, including if any theoretical benefits remain unproven, a CBDC may fall short of adoption targets and hold back central banks from achieving their goals (Denecker et al., 2022). The four hurdles encountered by Denecker et al. (2022) have been:

1) Managing the alignment of stakeholder needs across development stages

2) Market value proposition unclear, with benefits limited to established systems

3) Trust in government motives and fear of cybersecurity risks

4) Technological challenges (from existing infrastructure to the social digital divide)

Although the majority of literature focuses on the potential theoretical benefits of CBDCs, some literature, as mentioned above, has begun to challenge the ability for acceptance and adoption, even in cases where a CBDC is deemed to be needed. Included to fill the needs is the rise of modern Instant Payment Systems. Therefore, this thesis will serve as an extension to the ongoing research, and through expert interviews, an attempt will be made to provide solutions for the future.

SDG Goals as Motivation

Lastly, choosing a topic that included the promotion of the Sustainable Development Goals (SDG) was vital for my initial research motivation as it aligned with my Master in Management program, which focused on Sustainability and the SDGs. As money and payments are universal to societies all over the world for the majority of things we do, a CBDC or modern IPS has the unique benefit that it can indirectly facilitate all 17 individual sustainable development goals (SDG), providing access and efficiency to capital for investment, payment speed, cost and efficiency to people from all backgrounds, as well as investing in SDG projects (Ozili, 2023). In addition, a CBDC would also lead to more financial inclusion through more cost-efficient and accessible payments (SDG 1 and 5), provide digital payments efficiency, innovation and infrastructure for growth (SDG 8 & 9), reducing inequalities through expensive payment transfers (SDG 10) and lastly benefit the transition to a circular economy (SDG 12) (UN SDG, 2023).

1.2. Research Objective and Contribution

This thesis will contribute to researching the future of money and analyse the main issues surrounding the gap between the central banks and the currency users, namely the acceptance of new systems, with CBDCs and IPS being analysed. Due to the adoption and the acceptance CBDCs being researched less compared to other CBDC topics, two areas are shown to be prominent and create my research questions:

- What core features are essential for the future issuance of CBDCs or IPS by Central Banks?
- What options do Central Banks have, and how will issuance be affected by the motives of Central Banks compared to the needs of the general public?

On one side, the understanding of CBDCs and their potential has rapidly increased in recent years with published work, policy papers, proof of concepts, pilots being developed, and an initial few launched digital currencies (BIS, 2020). Not only central banks but many not-for-profit groups such as CBDC Think Tank (2023) or the Digital Euro Association (2023), as well as the for-profit Bank of International Settlements (2023), contribute to discussing topics. These are mainly focused on privacy, efficiency, technology, regulation, or debate on recently released White Papers or research from Central Banks around the globe. On the other hand, research has also been done on the capabilities of other options, such as Instant Payment Systems or other FinTech solutions, being proven to achieve most of the "positive" things that a potential CBDC could do. After the thought-provoking article from Prof. Eichengreen, what system would work most effectively (or least effectively) and why? What countries currently looking at CBDCs may face difficulty and why? If so, what are the alternatives?

The objective of this research is that Central Banks can use the analysis to help guide if a CBDC issuance is suitable in their jurisdiction. The main parts of this research will be focused on the actual applicability to the end users of money, the general public. Additionally, this research should support a platform where research is thin, while most of the effort is going into the potential capabilities, and the actual practicality of issuing a digital currency may not achieve the desired acceptance needed to achieve sustainable levels of adoption and have positive network effects.

1.3. Scope and Limitations

Due to the extensive and ever-growing research into CBDCs and other payment systems, it is essential to define the scope and limitations to avoid any confusion for future research. A CBDC or any other technology that will be intended for the use of the whole population must be correctly rolled out according to the specific needs and wants of stakeholders in their jurisdiction. This thesis has limited scope and will only focus on the general ideas of what is in discussion and will not have the capacity to include specific variances.

Within the landscape of payments, cross-border transactions and international use cases are increasingly having viable applicability for CBDCs or IPS to provide benefits (IMF, 2021). Although improved cross-border transaction 'bridges' between countries are plausible, CBDCs, however are being investigated mainly for domestic use (Eichengreen et al., 2022). Definite use cases can also be seen for cross-border transactions through a wholesale CBDC, which would not be accessible to the public and therefore will remain out of scope for this research (IMF, 2021). Remaining out of the scope of this research is the alternatives of cryptocurrency and bitcoin; although increasing global adoption has continued over recent years, too many uncertainties surrounding monetary and financial stability would arise if used as a default currency. Also, as pointed out by literature such as He (2018, p. 12), cryptocurrencies generally do not follow the three functions of money, as a means of payment, store of value and unit of account and are therefore not included in this research.

Furthermore, although financial institutions and corporations are also deemed as end users of money, this thesis will focus mostly on the general public, as the main arguments surrounding topics of financial inclusion, efficiency, and dwindling cash. Additionally, the adoption and acceptance of a CBDC by the author will focus on the new currency not only being desired as a store of value but also primarily as a new medium of exchange which is similar to cash. If a central bank wanted only to offer a CBDC as a store of value, for example, interest rates would be an arguable successful incentive for people to store their money at the central bank rather than at a commercial bank, as seen in a study by Bijlsma et al. (2021), which focused on public opinion from the Netherlands.

In terms of scope, it is important to note that a robust Instant Payment System viewed by the author is viewed as a widely already accessible system also acting as a Payment Service Provider and with a user interface as well that can be accessed, for example, via mobile phone as an app. This is the fundamental concept for retail CBDC and, therefore, is comparable in most aspects to the functionality of modern IPS systems. IPS will not be focused on only as the underlying systems, ones used only for single functions or systems in development such as SCT Inst in the EU by the ECB (ECB, 2023). This can be reflected by Sweden's Swish, Brazil's Pix or the upcoming PayNow system in the USA, where it can be used as a digital wallet for peer-to-peer transactions, POS payments offline at a retailer or also for online payments.

Finally, when talking about acceptance and adoption, it will be seen as freely chosen by the people and not forced using other regulations or constraints that a central bank could hypothetically put on its people (for example, forcefully phasing out paper money altogether). This would have other, perhaps more disastrous societal effects and lead to even more distrust in central government. This research also does not reflect adoption based on crisis situations if another financial crisis would occur, where pressure would be put on the general public to adopt a CBDC in case the trust due to an event such as a widespread banking crisis.

1.4. Outline

Section two will therefore focus on providing literature about existing topics on giving context and understanding of the environment where new systems will be launched.

Section three provides the methodology behind the primary research for this thesis

Section four shows an overview of the research participants insights from the results and analysis of the conducted primary research.

Section five finishes to combine the existing research from the literature review and the results from the primary research in a discussion to answer the research questions.

Section six then concludes the research while highlighting limitations to the research as well as identifying areas for future research.

2. Literature Review

In this section, two key areas will be focused on regarding the perspectives of the central bank and the end user. Within the literature review, the main arguments for both views will be explored, reviewing relevant and up to date research to gain a better understanding. This will be important when addressing the research questions, as literature provided will review the subsections of cash decline, monetary sovereignty and key considerations with issuance on the central bank perspective. Furthermore, of the literature review from the perspective of the users will look into the importance of trust, factors of acceptance of new payment systems and avoiding financial exclusion.

2.1. The Perspective from Central Banks

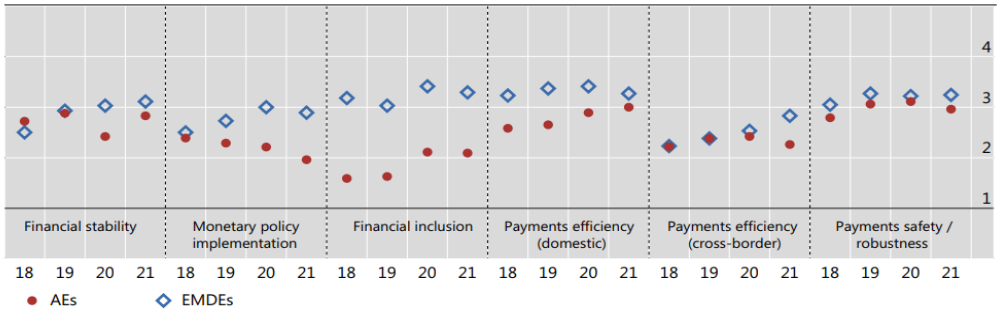
Central banks' interest in CBDCs occurred mainly due to two common motivations, according to the House of Lords Economic Affairs Committee (2022), firstly, due to the trending reduction of cash as an anchor of public confidence in the monetary system and secondly, the concerns about alternative payment currencies threatening the role of public money in the form of a global stablecoin or similar digital currency. These defensive reasons began the research and opened the potential for what else CBDCs could offer, also in terms of payments innovation, spurring competition and providing extra resilience to the system (Denecker et al., 2022). However, as pointed out by Denecker et al. (2022), "the case for CBDCs to date has been focused more on policy and systemic objectives than by specific customer requirements or benefits".

One of the earliest and widely cited pieces of literature from Dyson & Hodgson (2016) broadly highlights the benefits and how to implement such a system in the case of the Bank of England. Arguments are made for; widening options for monetary policy, financial inclusion, recapturing a portion of seigniorage, safer financial systems, encouraging competition and innovation in the payment systems, addressing the decline of physical cash and also competition from private innovations or non-national providers (Dyson & Hodgson, 2016, p. 1).

The main goals and design of CBDCs vary across different central banks. The Bank for International Settlements has identified several policy objectives for CBDCs, including enhancing the efficiency and resilience of payment systems, promoting financial inclusion, and maintaining monetary and financial stability (BIS, 2020).

However, central banks must also consider the design of CBDCs, including the level of centralisation, the technology used, and the privacy and security features (BIS, 2020). Below in Figure 5, the average importance of issuing a retail CBDC can be seen in the most recent research by Kosse & Mattei (2022) that surveys central bank progress:

Figure 5 – Motivations for issuing a retail CBDC: Average Importance



(1) = not so important; (2) = somewhat important; (3) = important; (4) = very important.

Source: (Kosse & Mattei, 2022)

Arguments criticising the Central Banks' authority to take on this new role, let alone provide competition or a platform for innovation, have received widespread criticism (Economic Affairs Committee, 2022). Although some jurisdictions lack innovation in the payments area, low-cost solutions are being seen globally, which parallels many arguments made by CBDCs (World Bank, 2021). This section will focus on the two main defensive arguments that originally motivated central banks to research CBDCs; 1) due to the continued reduction of cash usage and 2) retaining monetary sovereignty to keep central bank money relevant.

2.1.1 The Relevance of Cash Decline

In some countries, cash decline has been more drastic than in others like Sweden and Australia, which have seen massive decreases in cash use since the introduction of other payment options over the last two decades (Caddy et al., 2020; Ingves, 2018). In Europe, the payment habits of citizens were investigated by the ECB (2022), showing that cash remained the most used medium of exchange while simultaneously electronic payments continued to grow. Consumers in Europe still value having and storing cash while using electronic payments in day-to-day circumstances (ECB, 2022). In Sweden, as an extreme example, cash usage is so low that over half of all bank branches have stopped handling cash (Ingves, 2018). While the long-term trend for cash is in constant decline, cash use

increases again in major economies after hitting its lowest point during the first year of the pandemic (Cubides & O'Brien, 2022, S. 3). While the declining trends of cash share in payments remain, this signals a sign of resilience and relevance that cash still has a significant function in society (Cubides & O'Brien, 2022, S. 3).

A decline in cash for central banks would result in a contraction of the banks' balance sheet, as cash represents principal liabilities (Engert et al., 2022). A contraction would adversely impact the bank's seigniorage, reducing government revenue while simultaneously affecting the central banks autonomy (Engert et al., 2022). To offset the effects of disappearing cash, central banks will increase service rates for financial services provided to the financial industry and expand the balance sheet by acquiring government bills and bonds (Engert et al., 2022). Such measures would not distort financial markets nor compromise monetary policy objectives if implemented to a certain extent (Engert et al., 2022). Moreover, if the contraction of the balance sheet is unmitigated, it could seriously compromise a banks ability to provide liquidity during a financial crisis by selling and purchasing government securities and illiquid assets (Engert et al., 2022). The central bank, however, through the purchase of government securities using reserves, can amplify balance sheet expansion (Engert et al., 2022). As discussed by Engert et al. (2022) a decrease in the demand for cash would not significantly affect monetary policy, as it plays a minor role in the day-to-day liquidity of banks. Finally, research shows that the disappearance of cash could promote negative interest rates and change the obligation of banks to supply cash, resulting in increased stabilization (Engert et al., 2022).

Cash, or central bank money, provides support during disruptions to the system, especially when the public is relying heavily on electronic payments, and concerns emerge regarding the reliability of electronic payment networks (Engert et al., 2022). Central banks may respond to such concerns by issuing a CBDC to regulate private payment networks by providing alternative payment mechanisms. Therefore, a CBDC has the potential to reduce reliance on intermediaries such as payment networks (Engert et al., 2022). Furthermore, a retail CBDC could compete with private payment networks and, as such, offer an alternative, leading to increased competition benefiting contestability in retail payments (Engert et al., 2022).

In times of crisis, control directly impacts a person's willingness to engage. As such, the more control a person perceives to have, the higher their willingness to engage in risky activities (Armelius et al., 2020). If cash in circulation is reduced dramatically, limiting access, people will lose a sense of control, especially in times of crisis (Armelius et al., 2020). Not only does cash currently provide a safe store of value during a financial crisis, but it also provides a method to exit the banking system (Engert et al., 2022). As such CBDCs would serve as an alternative in times of crisis and maintenance of confidence in the banking system, offsetting the effects of depositors becoming less prone to bank runs (Armelius et al., 2020).

2.1.2 Monetary Sovereignty and the Relevance of Central Bank Money

Alongside retaliating from the dwindling usage of cash, monetary sovereignty and keeping central bank money relevant is the second most concerning perspective from the perspective of Central Banks (BIS, 2020). As explained by the BIS (2020), "significant adoption of money not denominated in the sovereign currency could limit the impact of monetary policy or the ability to support financial stability". This could come from the risk of cryptocurrencies, corporate stablecoins or potential foreign CBDCs if domestic user adoption rises to significant numbers (BIS, 2020). Commonly cited are the concerns for the monopoly power of organisations, for example, Meta's Diem stablecoin, which could have led to a disadvantage to the general public (Economic Affairs Committee, 2022). By offering a domestically issued CBDC that would sufficiently fulfil the needs of the users, monetary sovereignty would be maintained (BIS, 2020).

Another early and widely quoted paper by Bordo & Levin (2017) took under the assumption that paper currency would become obsolete eventually, looking into macroeconomic instability, loss of monetary control, systemic risks and susceptibility to severe downturns (Bordo & Levin, 2017). The research from Bordo & Levin (2017) highlights the risks associated with no longer having functional legal tender, with an absence of a CBDC and cash, leaving the Central Bank with no real policy alternatives in case of crisis. More recent literature by Armelius et al. (2020, p. 3) indicates that cash or digital cash would need to be issued due to a lack of trust in private money. Private credit comes with credit risk, and if too high, the government would need to step in, and private

issuers like banks have more incentives to issue more money; this could create inflation and undermines the value of money itself (Armelius et al., 2020, p. 3)

Moreover, as noted by Armelius et al. (2020, p. 6), money-issuing agencies earn from their transactions and are thus motivated to distribute money, which might lead to an oversupply and a decline in the value of the currency if cash would disappear. This would see a CBDC could then compete with these issuers, which would create healthy competition, pressuring issuers not to over-issue, and private money would become more trustworthy (Armelius et al., 2020). Therefore, even in countries with strong regulations and laws, the central banks have needed to step in as a Lender of Last Resort in cases where commercial banks run into illiquidity (Armelius et al., 2020). Although it may come with limits, several central banks with the cases made by Armelius et al. (2020, p. 9) of the Czech National Bank and the central bank of Chile, have been "operating for years at negative equity for years without experiencing any ill effects on their reputations or operations".

Finally, Armelius et al. (2020, p. 9) address if commercial bank money is safe enough, coming up with the conclusion that countries with 1) strong institutions, 2) sound government finances and macroeconomic policies together aspects such as a lender of last resort, regulations and supervision, commercial bank money is safe up to, and in practice beyond, the limit of the deposit insurance guarantee. Therefore, "neither cash nor a CBDC is fundamental to the monetary systems in these countries" in these instances (Armelius et al. 2020, p. 9). In a discussion of why cash or CBDCs may be fundamental, Armelius et al. (2020, p.15) point out that the role of uniformity of money can be maintained in countries where: 1) institutions are strong, 2) the government has the ability and willingness to address systemic problems quickly and 3) payment alternatives are instantaneous and understood to be so by the general public. Furthermore, Armelius et al. (2020, p. 15) conclude that a sense of control for people, as a reaction to the mistrust of commercial banks, to convert money back to central bank money is necessary, as it will, by extension, "support individuals' trust and confidence in their financial well-being and the financial sector" and provide stability.

2.1.3 Key Considerations for Issuance

Key lessons for the adoption of issuance are fulfilling unmet user needs, achieving network effects and being implemented at already "existing, accessible, technology and infrastructure (at point of sale)", meaning it would not be necessary to use new devices (BIS, 2021, S. 2)**.** The BIS (2021, p. 4) report also highlighted many very successful instant P2P systems such as Swish, MobilePay, Vipps, and M-Pesa, citing "key success factors appear to be that offered a service in a market where no convenient digital alternative existed". Unsuccessful systems were also highlighted in the report such as Digicash Inc., the finish Avanat system or Paybox in Germany which failed for various reasons, however, it's important to note these were all before mass adoption of mobile technology we see today (BIS, 2021).

Recent success in the development and adoption of Payment systems can be seen not only in India but also Brazil. In little over a year after its launch, the Pix IPS was used by 67% of all adults in Brazil (Duarte et al., 2022, p. 3). Included in this figure is 30% of the adult population that had not made any account-to-account transfers 12 months prior to the launch of Pix (Duarte et al., 2022, p. 5). Duarte et al. (2022, p. 3) argue that two factors resulted in the success of Pix; 1) the mandatory participation of large banks' to kick-start network effects for users and 2) the central banks dual role as an infrastructure provider and governance of rules. Although the Instant Payment System fulfils the goals of its central bank in Brazil, the "key difference is that CBDCs would be a claim on the central bank rather than on private intermediaries, allowing for more direct settlement" according to Duarte et al. (2022, p. 8).

One of the most widely studied successful rollouts of a modern peer-to-peer mobile payment system was in Kenya in 2007, introduced by Safaricom, a Kenyan subsidiary of Vodafone (Vanham, 2012). Since the launch of M-Pesa, attempts to replicate its success have been largely unsuccessful (Vanham, 2012; Heyer & Mas, 2011). At the time of M-Pesa's launch, Kenya had a large population of unbanked or underbanked people who lacked access to formal financial services, and M-Pesa served as an excellent way to send money to each other (Vanham, 2012). M-Pesa had a large, already existing mobile infrastructure for its network and a lack of other alternatives for payments (Heyer & Mas, 2011). Vanham (2012) and Heyer & Mas (2011) both mention that other countries

struggled to replicate M-Pesa due to a higher percentage of people having access to the existing alternatives resulting in less demand for its service. Heyer & Mas (2011) point out that M-Pesa allowed for ease of access was affordable, and could benefit from Network effects. In Tanzania, M-Pesa has been successful in allowing the government to accept personal income and other tax payments via the system, which shows different uses, as discussed by Vanham (2012). The central banked also owned 35% of the issuing business, allowing for the central bank to ensure M-Pesa deposits in the banking system (Centre for Public Impact, 2016).

2.2. The Perspective from Users

The literature suggests that end users have a wide range of needs and wants when it comes to CBDCs. A study by the Bank for International Settlements (BIS, 2021), found that users are attracted to the ability to make fast and inexpensive digital payments at a low cost, whether in person or online. This is particularly relevant in a digital era where e-commerce and online transactions are becoming the norm. The needs and wants below have been collected from various sources, including BIS (2020); BIS (2021), and Kantar Public (2022):

- Universal acceptance by all merchants, offline and online
- Instant and contactless payments
- One-stop solution reducing the need for multiple cards or IDs (streamlining)
- Easy to understand and use by all groups of people regardless of disability or age
- Secure and reliable regarding privacy and personal data
- Safety of funds in normal and crisis periods
- Biometric authentication (where available)
- Cost efficiency (no or low costs) compared to existing solutions
- Offline functionality to maintain a cash-like experience
- Users control of their own data

Three further subchapters will be explored, highlighting the relevance of the perspective of the users. The first will be trust in government and institutions, as this can be a key factor for the adoption and acceptance of a new CBDC or IPS. The second will be looking into the overall factors for accepting a new payment system from the view of the user.

Lastly, will be the most affected groups, focusing on avoiding financial exclusion rather than inclusion.

2.2.1 The Importance of Trust

After the initial launches of CBDCs, trust remains a large challenge so that a meaningful share of people will contribute to the new system, with many questioning the motives of CBDCs, often suspecting governments operating in bad faith and fearing cybersecurity risks (Denecker et al., 2022). In a 2022 paper released by Barreiro et al. (2022, p. 12), state that "the higher the trust in banks in general, the greater the willingness to adopt a rCBDC". Other empirical analyses from Chandra et al. (2010) and Gao & Waechter (2017) show that the most significant long-term barrier to user adoption for mobile payment systems is trust. (Barreiro et al., 2022, p. 12). According to the Edelman Trust Barometer (2023), businesses have a tendency to be more trusted than governments overall. There is also a difference between trust at home against perceived trust from abroad, with the example of India showing a much higher level of trust domestically (Edelman Trust Barometer, 2023). The intended usage of a CBDC is the lowest for people who do not generally have trust in banking organisations (Bijlsma et al. 2021).

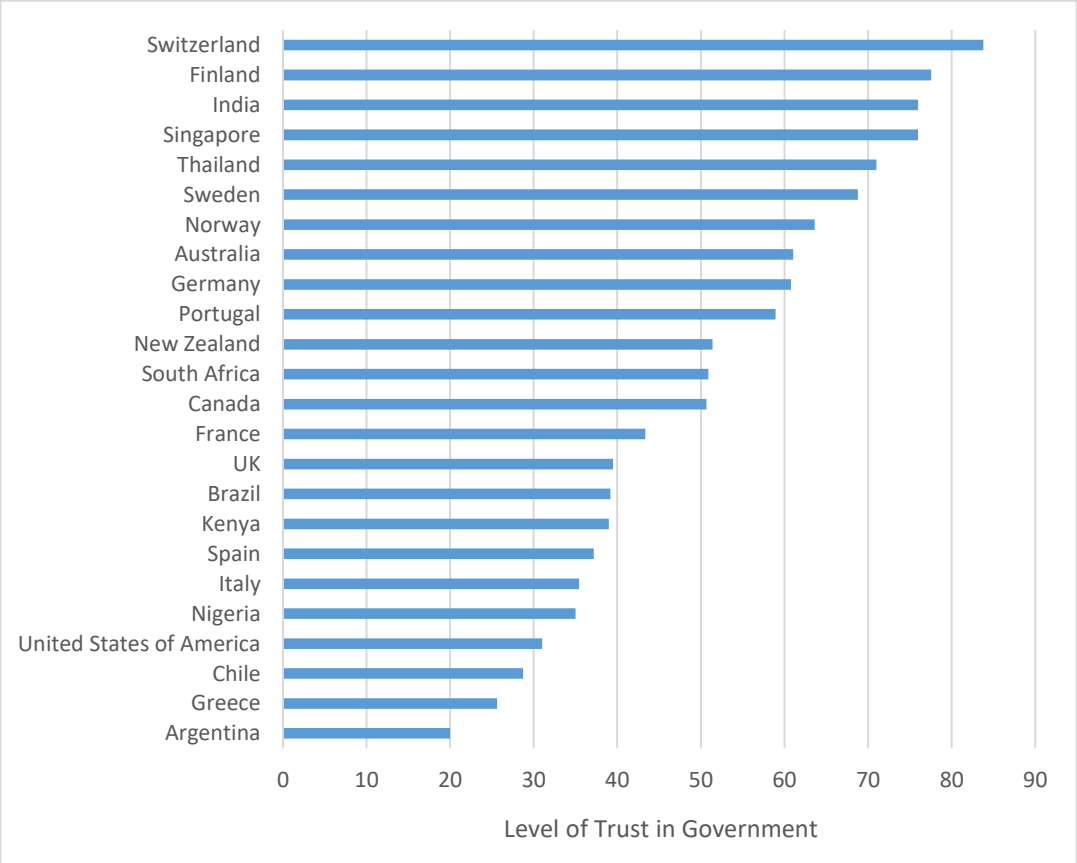
In the case of Ecuador, Dinero Electronico, a mobile payment system allowing citizens to transfer USD balances in real-time was released in 2014 with the belief that wide adoption would occur and generate positive stimulus for the economy (Arauz et al. 2021). In the cash-heavy country, the deployment needed to be larger, with enough incentives and the network externalities to ensure its full adoption potential was never reached (Arauz et al., 2021). As pointed out by OECD (2021), trust in the government by the public in Ecuador was reduced dramatically during the time Dinero Electronico was released. Publicly, a succession of articles by economic journalists at the time in Ecuador was calling out the mistrust in the system, highlighting the previous abuse of power that had occurred previously by the government, stating that it would likely not succeed solely due to the lack of trust by the public (Calderón de Burgos, 2016).

Currently in Nigeria, which released its CBDC eNaira at the end of 2021 and similar consequences so far regarding slow adoption can be seen (Ree & Wezel, 2023). In a report by Munshi (2021) for the Financial Times, it was highlighted that there is mistrust between ordinary Nigerians and the government in terms of adoption, with experts citing

that the government would have control over the system and people. A report for the IMF by Wezel & Ree (2023) reviewed the opportunities and challenges for financial inclusion in Nigeria, as it one of the central banks top priorites for the CBDC. In the report, alongside improving digital literacy, trust was cited as a key factor in why Nigerians were choosing cash over the digital alternative (Ree & Wezel, 2023).

In order to understand the importance of public trust in government, being the assumed issuing institution in this analysis, data collected by the OECD (2023) and the Edelman Trust Barometer (2023) is shown below in Figure 5. The number at the bottom of the graph represents how high the public level of trust of the government is in each country. Below, a sample of countries that are illustrated have launched either CBDCs, Pilots or are in the Development or the research phase of releasing either a CBDC or IPS, according to the Atlantic Council (2023) and World Bank (2021).

Figure 6 – Levels of trust in Government



Sources: created by author, based on OECD, (2023); Edelman Trust Barometer, (2023)

2.2.2 Factors for Acceptance of New Payments System

Research on the acceptance of technology can be traced to Davies (1989) first introducing the technology acceptance model (TAM) to information technology (Barreiro et al., 2022). According to Barriero et al. (1989), the TAM is the most widely used model for analysing how people embrace and then utilise new technology. The most significant explanations for the usage of technology are its perceived utility and its simplicity of use (Davies, 1989). Typically, perceived usefulness is defined as the extent to which users feel technology will enhance the execution of an activity it is intended to help (Barreiro et al., 2022). Perceived ease of use is the degree to which a customer believes that using a product or service will involve little or no effort (Barreiro et al., 2022).

Regarding CBDCs, the BIS (2021, p. 9) concluded that no one size fits all approach will ensure adoption, and a roll-out strategy balancing user needs is essential, especially because a CBDC could vary depending on the needs of a specific jurisdiction. A general overview of features and user stories was highlighted by the BIS (2021, p. 6-8) reported the following different needs a CBDC would need to fulfil: 1) Safety of funds in normal or crisis periods; 2) Convenient, low cost and quick payments; 3) Offering a cash-life 'offline' option; 4) Perception of security, fraud protection, trust in intermediaries; 5) Protecting privacy; 6) Universal accessibility regardless of impairment.

As mentioned above in the case of M-Pesa, Heyer & Mas (2011, p. 5) pointed out that if there are many good alternatives to the new system, it will be challenging to convince users to switch to a new mechanism, citing first mover adoption and existing established network as key drivers. Although the technology of M-Pesa was based on mobile payments rather than a more modern system, the key success factors can serve as a reminder that it served a need in the market where no convenient digital alternative existed, and onboarding was easy (BIS, 2021). The public had a high level of trust in the issuing provider, Safaricom, resulting in an easier way for M-Pesa to onboard customers (Heyer & Mas, 2011).

An additional study by (Le et al., 2023) of 55 countries from 2014 to 2021 on different stages of a CBDC finds that issuing CBDC relative to research adoption is more developed in countries with greater risk of money laundering and terrorist financing. Furthermore, the study showed that greater access to financial markets and countries with

higher innovation would lower the probability of launching a CBDC relative to research adoption, reflecting the "exponential growth of cryptocurrencies in recent years" (Le et al., 2023). In contrast, a study by Juhro et al. (2022, p. 10) showed that higher levels of financial development increase the likelihood a country will adopt a CBDC. Furthermore, the same study showed there is a negative correlation between financial inclusion and retail CBDC adoption, suggesting that as the level of financial inclusion increases, the adoption of retail CBDC decreases (Juhro et al., 2022, p. 10).

Another paper by (Houng et al., 2023) based their research on public perception, using Facebook data from 2012-2022 using deep learning algorithms for text mining. The study showed that "government performance, inflation rate, economic inequality, and technological literacy have a significant influence on the public's perception", highlighting that substantial public support is necessary for adoption (Houng et al., 2023). Regarding public opinion, government effectiveness had a strong influence on favourable public sentiment as well as DeFi adoption levels among the public and financial inclusion put significant pressure on adoption (Houng et al., 2023).

To conclude, the factors for optimal acceptance are:

- Trust and favourable public opinion in the issuing party and technology
- Significant demand for the services that will be offered
- Already established network for scalable adoption
- First mover advantage (benefitted by monopoly status)
- Lack of other alternatives offering the comparable solutions
- Favourable regulatory environment to enable the public or private issuer

2.2.3 Avoiding Financial Exclusion

While new digital opportunities emerge, digital financial literacy is of high priority when viewing the users' perspective (Barreiro et al., 2022). Although financial literacy itself may be a difficult hurdle to overcome, the lack of digital literacy may leave a significant portion of society excluded from the system as they are less technically adept users (Auer & Böhme, Central bank digital currency: the quest for minimally invasive technology, 2021).

The most impacted group if cash disappears is the unbanked or underbanked. In a report by Kanter Public (2022) which was done with participants in Europe, it was noted that there needed to be more interest in payment services provided by banks for the unbanked. Together the strong need for cash was accepted everywhere, which is the main reason why this group also remained unbanked (Kantar Public, 2022, p. 12). As highlighted by Eichengreen (2022), India was able to address the problem of the unbanked by "requiring commercial banks to offer no-frills savings accounts with no minimum-balance requirements" alongside another scheme which similarly tasks public banks to offer a zero-balance low-cost account, the success of opening 400 million accounts.

In the report by Kantar Public (2022), a focus group included was the Unbanked/Underbanked. The following key features that a new payment method should have were assessed by the Unbanked or Underbanked were; (Kantar Public, 2022, p. 12).

- Easy to use with easy to use without requiring technological knowledge
- The service would be free of charge
- Safety and Security were important for keeping personal information secure
- Robust customer support system where face-to-face support needed
- Ability to track expenditure easily and control spending behaviour

In a publication for the Bank of International Settlements, Auer, et al. (2022, p 17) made it clear that the pandemic made it clear that not all consumers had access to payment cards, bank accounts and digital wallets. The USA relied on cheques and prepaid cards to reach those that are unbanked and elderly (Auer et al., 2022, p. 17). If cash were removed, a 'payments divide' would be created, which would negatively affect those who do not have the financial literacy needed (Auer et al., 2022, p. 17).

In conclusion, the literature indicates that end-users have various needs and wants for CBDCs, including universal acceptability, quick and inexpensive digital payments, ease of use, privacy and personal data security, and user control over their own data. Yet, trust remains a big barrier to the implementation and acceptance of CBDCs, with many individuals questioning the objectives of governments and institutions and fearing cybersecurity threats. Financial inclusion is also essential, with an emphasis on preventing exclusion as opposed to inclusion when transitioning to a digital based system.

This occurs not only due to the lack of financial literacy, but the digital aspect needed. For the successful implementation and adoption of CBDCs, it is vital to comprehend the perspective of users, their trust in government and institutions, and the general acceptance considerations for a new payment system.

3. METHODOLOGY

The primary data collection of this research will be based on semi-structured interviews (see Appendix 1) conducted with experts from a wide range of fields, including central banks, leading economists, CEOs and founders operating within the space, and payment specialists. The experts identified were done so through purposeful selection, either being contacted directly or through an institution and acted as a representative or independently. If contacted directly, selection through published research or policy paper area of research was the main criteria. Therefore, an independent overview from experts will be beneficial to provide a deeper and more complex understanding about the future of money and the gaps between central banks and users' needs.

At the beginning of each interview, the research purpose was explained as well as any questions clarified from the expert's side. The semi-structured questions were styled as being open-ended questions, allowing for a deeper understanding of the specific area of expertise of the interviewee.

There will be 12 interviews, two sets of 6 interviews with the same questions in each block following different topics for the research. After the interviews, the responses were transcribed and a thematic analysis was applied to the interview data, facilitating the extraction of any patterns in answers and themes according to the relevant questions. The entire process was considered carefully according to ethical considerations, ensuring that consent for transcribing, confidentiality, as well as the voluntary nature of the interviewees was maintained. The responses have been anonymized due to the privacy of each respondent due to current developments of projects in certain jurisdictions.

The first block of 6 interviews was used to gauge the fundamentals of CBDCs and the future of money from the perspective of the central bank, referring to either their independent thoughts about the questions asked or specifically the developments occurring in their own jurisdictions. The second block of 6 interviews was used more specifically to gauge the ideas of the future of money, the paths that seem feasible with a specific focus on the users and acceptance of a new currency or payments system, either in a general sense or specifically in the developments in their own jurisdiction. The countries where the experts have been working at, with or consulting about the future of money topics have been but are not limited to, Australia, Argentina, Bahamas, Brazil,

Canada, England, the EU, India, Kenya, Nigeria, New Zealand, Sweden, Switzerland, Ukraine, and the United States of America. To facilitate further understanding, an overview of the semi-constructed questions used in the two blocks of interviews can be found in Appendix 2. Below in Table 2, a summary of the expert's general organization, and role have been summarized as well as the duration of the interview.

Table 2 – Overview of Interviewed Experts

No. #	Organization	Role	Duration of Interview
Interview 1	Central Bank	Director and Lead Economist	46:55
Interview 2	Central Bank	CBDC and Payments Advisor	71:15
Interview 3	Central Bank	Senior Economist	58:29
Interview 4	Central Government	Researcher and Economist	38:30
Interview 5	CEO and Advisor	Senior Payments Expert	32:56
Interview 6	CEO and Advisor	Global Payments Advisor and Economist	54:42
Interview 7	Senior Advisor	Digital Solutions Expert	41:40
Interview 8	CEO and Advisor	Global Payments Advisor and Economist	35:51
Interview 9	Central Bank	Payment Provider Specialist	30:37
Interview 10	Central Bank	CBDC Researcher	33:17
Interview 11	Global Non-Profit	Director and Researcher	52:16

4. Results and Analysis

The results and analysis presented were conducted using expert interviews as a research method. The following section will review the conducted research, addressing the topics in a parallel view as seen in the literature review. Therefore, these will be organized from the perspective of the Central Banks and the Users in order to focus on answering the research questions clearly. Lastly, the summarized view about the future of money will be assessed, including the core ideas surrounding how central banks can go about issuing either a CBDC or IPS in the near future.

4.1 The Perspective from Central Banks

Experts generally agreed that the motivations for central banks to issue a CBDC were of a defensive nature. Considering the global decline in cash, the majority of Experts emphasised the motivation to promote financial inclusion and/or prevent potential financial exclusion for the unbanked/elderly while yet providing everyone with access to central bank money. In addition, monetary sovereignty as a response to the potential of foreign currency being used domestically could be detrimental to stability and the central bank's mandate. A new payments system, regardless if CBDC or IPS, was mentioned by half of the experts with regard to the potential new platform for innovation and growth potential. Motivations regarding the benefits of efficiency, competitive payment systems, cost reduction, providing resilience when necessary, and bolstering the role of central banks in the digital age were all mentioned. Regardless of issuance, experts did point out that we have never been in a situation where people in a developed country have not had access to central bank money, and although, in theory, stable economies would see not much difference, we have no idea what will happen.

When questioned about the need for a new payment system, the consensus among experts was that, on the one hand, a CBDC might not be necessary if traditional payment mechanisms are modern and operate smoothly. On the other hand, certain central banks may be compelled to build a CBDC in light of defensive reasoning, i.e. the rise of stablecoins and cryptocurrencies and the potential threat to monetary sovereignty. In some nations, such as those without an efficient payment system, a CBDC could solve payment-related problems. However, in others, where alternative payment channels are already well-established, it may not be essential. Before launching, the CBDC should

have feasible use cases, with some experts going so far as to suggest a CBDC could facilitate future networks not available today, such as providing micropayments between machines in a system where every physical asset also has a digital fingerprint and a CBDC could facilitate in making micropayments between machines. Regardless of what system would be issued, experts mentioned that the prospective adoption rate and reputational risk, as well as regulatory compliance, were highly relevant if issuance occurred.

Furthermore, several experts argue that a CBDC may be useful for unique challenges, depending on the jurisdiction and use case, whilst others assert that the necessity for a CBDC is ambiguous and that quick payments are already a solution to some existing problems. Some experts suggested that the private payments sector of the industry has a greater use case for CBDC than central banks, while others argued that central banks might take a defensive stance to maintain monetary sovereignty. In the end, the success of a CBDC will depend on cross-border capabilities, trust, and the potential costs and expenses evaluated against any legislative goals or perceived benefits.

Developing back-end solutions for innovation and cross-border transactions, making central bank money more usable and efficient, and exploring the potential to improve cross-border transactions were determined to be the central bank's greatest opportunities regarding the future of money, according to the experts. There was discussion amongst two experts that there may also be a possibility to alter the current monetary system and re-evaluate who has power and benefits from issuance. However, this is only from a theoretical perspective based on technology utilisation. Investing in technology and assessing choices is viewed as advantageous, with Experts mentioning that commercial banks may need to become less reliant on the government.

The risks associated with a central bank maintaining the status quo include a reduction in user choice, the loss of monetary sovereignty, and falling behind in the innovation of the financial industry. Additional concerns include missing out on the advantages of the digital space, lacking access to a modernised monetary system, and potentially restricting competition and innovation. There are, however, significant drawbacks to creating a CBDC, including disruption of the existing system and potential for disintermediation. Ultimately, the choice to implement a CBDC should be determined on a country-by-country basis, taking specific circumstances and requirements into account.

The risks associated with a central bank maintaining the status quo include the potential loss of monetary sovereignty and access to CB money, the loss of currency dominance, and exclusion from the international monetary system, according to the experts. Prompt responses to shifting trends and legislation are required by policymakers to protect consumers. In addition, there is the possibility of private firms taking control of payment networks and evading rules. Access to public funds is required to maintain confidence in the system, and cautious experimentation is necessary to maintain competitiveness in case of any eventuality.

Overall, the experts agreed that Central Banks should continue to research and develop the technology necessary for issuance in their jurisdictions, according to their specific business model and use cases. The strategy going forward should include a state of readiness to issue when the time is right, also mentioning that both CBDC and IPS options should be explored. Experts mentioned that a good idea would be to first look into issuing an IPS in those countries where there was a lack of instant payment systems, and then potentially upgrading this to a CBDC in the future. The reason being an IPS is connected to existing infrastructure and would create less disruption to the system. Two experts were confident that the long-term strategy needed to include exponential thinking where digital assets are dominant, and we would need a digital currency to serve as the core building blocks of this new environment.

4.2 The Perspective from Users

The experts stressed the importance of privacy and the need to safeguard the data and rights of users. They stated that CBDCs should be non-programmable and cash-like from the user's perspective. Programmability should be an option for users; however, only similar to how you can set up a direct debit to your bank account using your own money, but not the actual central bank money itself. In addition, the experts proposed that central banks may need transaction restrictions for regulatory purposes, similar to present systems with AML checks in a tiered system where smaller transactions, for example, buying a cup of coffee, might be executed without authorisation, making the process even faster. Furthermore, the concept of programmability was only briefly touched on again to a technical extent, such as expiring money in an offline system, allowing that money to re-enter a person's wallet after a period of time, has been tested and was well received by

users. The use of programmable currency to restrict the liberties of users was not supported at all by any experts. Privacy and security were deemed the most crucial factors regarding the technology for users to invoke trust in the system, and the CBDC's approach should be tech-agnostic in that sense.

Experts agreed that whichever payment system will be issued would need to fully fulfil the needs and wants of the user in order to reach sustainable levels of adoption and widespread acceptance. The mentioned aspects from experts include ease of use, proven security and privacy of funds, options for interoperability, having access 24/7 from different platforms, direct settlement at a low cost and with all stakeholders onboard in a clean rollout. Financial inclusion of users, as well as discussion surrounding the unbanked, underbanked, and elderly, were also of concern to experts, explaining that the issued system should make sure people do not get financially excluded in the process. Experts mentioned that running cash parallel to issued systems should remain a top priority so that the exclusion of users does not occur. Several experts mentioned that the recently issued systems such as PIX tend to reach the limits of financial inclusion, and the next step would not be solved by a CBDC, however, rather other solutions, such as a free bank account program or the increase in the Internet would result in more inclusion for its users.

After fulfilling the essential criteria regardless of the system, in order for a CBDC or IPS to be adopted, trust in the government or an issuing body is essential, according to the experts. The consensus amongst experts was that a higher level of confidence in the issuing party could increase widespread adoption, with lower levels having the opposite effect. The success of any payment system depends on the public's faith in the institution with which they will interact directly. Each jurisdiction must demonstrate a genuine need to implement a CBDC or IPS, along with addressing privacy, information, and fraud concerns, and prove the benefits. When reflecting on already issued CBDCs, several participants noted that Nigeria had not provided clear evidence to the public as to why eNaira should be issued and that the lack of public trust in the government has played a significant role in the current low level of public acceptance. One expert pointed out that some consumers prefer banks to hold their money at commercial banks or themselves rather than the government, and in some countries, people use cash or cryptocurrencies as an alternative payment method due to a lack of trust in the government.

4.3 The Way Forward for Future Issuance

The experts recommended a variety of strategies for central banks to pursue in the future. The main consensus was to develop a business model or use cases for the future that permits innovation and is ready to implement if needed. Another expert wanted the strategy to be long-term, where a future was envisioned in which everything is a digital asset and proposed the construction of a separate infrastructure and system with its own rails for resilience and adoption. There were also three potential arguments for different strategies a central bank could have for a CBDC: (1) to ensure basic payment technology is available and not monopolised by a single entity; (2) to maintain monetary sovereignty and prevent the use of foreign currency within its jurisdiction; and (3) to provide a means for micropayments between machines and the internet of things using central bank money. These would all be dependent on the needs and challenges of the jurisdiction itself, although, in any scenario, it is important to offer cash as long as it is in demand by the users and system.

Some experts pointed to a retail CBDC having only weak use cases at the moment in the majority of jurisdictions, whereas a wholesale CBDC might have more use cases regarding innovative and cross-border applications. In addition, issues were discussed with experts over the requirement for a resilient system and the potential cost-benefit trade-offs between constructing a distinct CBDC network and connecting it with the existing infrastructure. In terms of adding to the existing payments infrastructure, experts agreed that there could be a place for a CBDC; however, core arguments from central banks, such as financial inclusion, can also be reached through IPS or private sector solutions such as M-Pesa.

Central Bank-Settled IPS, such as Pix, may or may not be able to address all the issues posed by a CBDC, according to the experts. Some argue that these technologies already provide fast payments and financial inclusion, calling into doubt the necessity of a CBDC. Others argue that CBDCs could be more beneficial for wholesale use cases, cross-border transactions, and interbank transaction efficiencies if they were settled more directly. There was consensus that the development of an instant payment system is distinct from the development of a centrally backed currency, as an IPS is still account to account, whereas a CBDC is actually digital money, even though the user experience may be

remarkably similar. Experts suggested that looking solely from the perspective of applicability, central bank money may provide greater functionality in the long run.

According to the experts, the acceptance of a CBDC compared to an IPS largely depended on meeting the needs and desires of users, such as usability, accessibility, and swift settlement. Acceptance is also influenced by network effects, such as immediate adoption by stakeholders, with trust being the most important factor. India's and Brazil's recent issuance of the UPI and Pix systems are regarded as successful examples of recent acceptance. For widespread adoption, interoperability and usability are crucial, and existing payment rails can be made more efficient.

The experts agree that a certain level of adoption is required for the long-term sustainability of CBDC investments. In addition, they emphasise the significance of preparation prior to issuance so that a rollout would be successful and the need for countries to keep researching and developing the CBDC so that issuance can happen quickly if necessary. On the one hand, reaching a certain level of adoption is essential for network effects and justifying the cost of maintaining the system; on the other, others indicated that different jurisdictions have different goals, explaining that access to central bank money is essential if cash levels reduce.

To conclude, the experts indicated that the performance of a retail CBDC in a country with an existing IPS would depend on its competitiveness and design. If the IPS is currently performing effectively and satisfying the needs of its users, a retail CBDC may not be necessary and may underperform. Furthermore, the real use case of a CBDC in the jurisdiction and the public's trust in the new payment method would determine its success.

5. DISCUSSION

As shown through the literature review and expert interviews there is wide support for central banks to maintain their mandate and serve the general public, ensuring further access to central bank money and overall stability. The risks are rising if central banks choose not to act, largely shown through the defensive reaction towards monetary sovereignty, triggering research into CBDCs. Furthermore, technological advancements continue to evolve the future of money, and an inability to leverage innovative solutions create risks for a country to becoming less relevant in the global financial landscape, potentially leading to long term loss of trust in their ability to maintain stability and serve the needs of the public. In terms of the user's perspective, it is important that the issued system must prioritise to have a deep understanding to meet as many users' needs as possible within its jurisdiction. Ensuring its ability to maximise its societal reach and network effects for a high level of utility through inclusion and the least amount of potential exclusion to occur. Therefore, cash will only be phased out if unwanted by the public and in some cases prove to be the only viable option for access to central bank money.

According to the ongoing research and the expert interviews conducted, it is proven that almost all technological challenges of a CBDC are feasible, and therefore the issues such as privacy concerns being mitigated, or efficiency barriers of technology are assumed to be possible for the outcome of this research. As seen in the literature, it must also be assumed that the issued system will not face barriers through the regulatory framework and involve effective marketing and onboarding, which includes involving a wide range of retailers engaged in the launch. The necessity for all stakeholders to be actively engaged in the system during onboarding, as described during the expert interviews, will be crucial to ensure network effects be launched successfully.

When all the above-mentioned aspects have been taken care of by an issuing body, and we can hold aspects as a constant, two other fundamental issues were identified in this research that undermines the feasibility of the issuance of a new system. Regardless if all other factors have been taken care of; two aspects remain essential for issuance:

1. High levels of trust in the issuing body by the users
2. Lack of a domestic efficient modern payment system (e.g., an IPS)

If the aspects involving trust and reflection of alternatives are not recognised, then an arguable ‘optimal’ preparation and rollout will, according to the literature and expert interviews, result in a failure to reach sustainable and likely desirable levels of acceptance and adoption on a large scale. To demonstrate this theoretical understanding, below in Table 3, recommendations for countries can be seen that are currently undergoing past, current and future projects around the globe.

Table 3 – Recommendation for Central Banks

Country	Trust in Government	Domestic Robust IPS Widely Used	Recommendation for Central Bank
Brazil	Low	Yes	Retail CBDC will be difficult to implement
Canada	Medium	Yes	Either CBDC or IPS
EU (Average)	Medium	No	Either CBDC or IPS (adoption difficult in countries with existing IPS)
Germany	High	No	CBDC
India	High	Yes	Retail CBDC will be difficult to implement
New Zealand	Medium	No	Either CBDC or IPS
Nigeria	Low	No	No CBDC, IPS Recommended
Portugal	High	Yes	CBDC or new IPS will be difficult to implement
Singapore	High	Yes	CBDC or new IPS will be difficult to implement
Sweden	High	Yes	CBDC or new IPS will be difficult to implement
UK	Medium	No	Either CBDC or IPS
USA	Low	No	No CBDC, IPS Recommended

Source: created by author using information from ACI (2022), Edelman Trust Barometer (2023) and OECD (2023)

To conclude, the majority of countries will face difficulties in acceptance and adoption when implementing a retail CBDC. Either the trust in government overall is too low or an underlying instant payment structure is already available. This recommendation does not reflect the current research of those countries or any pilots of the launch of a CBDC that has occurred and should only be used as a guide within the scope and limitations of this research. This recommendation has also been reflected in the expert interviews, with the general consensus amongst experts asked agreeing that the acceptance and adoption of a newly issued system will be either difficult or unnecessary if existing technology would suffice the current needs within the jurisdiction.

6. Conclusion

Though a CBDC may provide more functional potential in the future, the issuance of a successful CBDC is no easy task for central banks and will likely only be viable in specific jurisdictions where conditions are suitable. In terms of the defensive cases regarding cash slowly dwindling in most countries and the argument for maintaining monetary sovereignty while keeping central bank money relevant, a clear case can be made by central banks. However, the potential benefits of a CBDC in terms of efficiency, cost and speed of transaction has already proven to be effective using existing payment infrastructure for users and solutions of an IPS. In financially stable countries, it is theoretically possible that we could function without access to central bank money, assuming regulations were to be put in place to avoid a monopoly in the payments landscape. In contrast, experts did point out that we have never been in a situation where people did not have access to central bank money, although theoretically, it is possible for the system to remain largely undisrupted.

As seen in the recommendations for central banks during the discussion, trust in government and an existing robust IPS are two significant challenges regarding the issuance and adoption of CBDCs in general for central banks. As experts pointed out, an IPS can provide many but not all of the solutions a CBDC has to offer, utilizing the existing infrastructure. However, other experts pointed out that in the future, we may have other needs for a payment system that only a CBDC could fulfil, such as micropayments between machines where every asset also has a digital fingerprint and can handle transactions such as micropayments between machines.

Going forward, the literature and experts suggest continuing researching on CBDCs and testing through pilots in order to gauge the needed requirements of the jurisdiction. This will be vital to make sure central banks are ready in terms of technology and design to cater to the needs of the people in their jurisdiction. As the results of this research suggest, regardless of how optimal a CBDC is built to the needs and wants of the users or reflects the good intentions of a central bank, if an IPS is already present with comparable functions or the level of trust an issuing provider has by the public is too low, issuance is going to be a challenge.

6.1. Limitations of the research

Although some literature reviewed did raise concerns for financial and monetary stability in the event of a cashless society with no alternative, other literature and experts mentioned it would likely have minimal effect if this occurred in stability conditions where high levels of trust in intermediaries are present. The experts did reiterate that we have had no cashless economy, where people do not have access to central bank money on a broad scale. Therefore as this research suggests, there is a high level of certainty about what will happen if this scenario eventuates. If it were not feasible, counter to the research from, Armelius et al. (2020) and our expert's opinion, then access to central bank money through either cash or a retail CBDC would have an even more important role to play in society.

Although a recommendation has been made as an example of how this research can be applied, this is only a general consensus. Every country is extremely complex and has unique regulations and jurisdiction on the one hand and also has its own unique consumer needs, wants and behaviours on another. This research should only serve as a general overview of the decision-making to be explored further.

6.2. Identification of areas for future research

More comprehensive research and analysis are needed to extend this research to be feasible as it is a generalisation. Research surrounding acceptance and adoption is the most fundamental in order to make sure all of the effort being put into the research and pilot programs are worth it. If a central bank can recognise that no adoption is possible due to issues raised in this thesis, alternatives in terms of regulation or technology need to be addressed quickly if the central bank does not want to further lose relevance. For example, retain monetary sovereignty or make sure that no one is financially excluded in a rapidly evolving system.

Furthermore, the continuation of comparative analysis between IPS and CBDC is needed in order to evaluate a potential coexistence using different functions is possible. Experts highlighted the potential need for both and that they are not mutually exclusive in their own right as they serve different functions to society. The focus on the end user in the case of this research could serve as a foundation for future research in this area, as technologies have proven to be useful only if they are utilised enough.

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APPENDICES

Appendix 1: Interview questions

First Round of Experts

Q1: What are your current thoughts about the perspective of a Central Bank motivations (i.e. reaction to the reduced usage of cash or want for financial inclusion)?

Q2: What is your opinion about a Central Bank settled IPS system such as the UPI in India or Pix in Brazil as an alternative to solve many issues Central Banks? Could this be a solution?

Q3: What would be then the largest risks that would entail for a central bank to just stay at the status quo?

Q4: What are the largest opportunities that you believe a central bank sees regarding the future of money?

Q5: People fear CBDCs privacy reasons or programmable money, what is your thought on this?

Q6: What strategy do you think a Central Bank should have looking forward?

Q7: How do you feel about the statement, “A CBDC is a solution looking for a problem"?

Second Round of Experts

Q1: A CBDC is a solution looking for a problem?

Q2: What are your thoughts about acceptance in terms of new payment systems?

Q3: What would be then the largest risks that would entail for a central bank to just stay at the status quo?

Q4: How important specifically do you think trust in government, or the issuing provider is important for the adoption of a CBDC or IPS? How can this influence adoption or acceptance?

Q5: From experience, would issuance need to reach a certain level of adoption, or would a CBDC be there just as an option (as cash use is dwindling)?

Q6: What is your opinion about a Central Bank settled IPS system such as the UPI in India or Pix in Brazil as an alternative to solve many issues Central Banks? Could this be a solution?

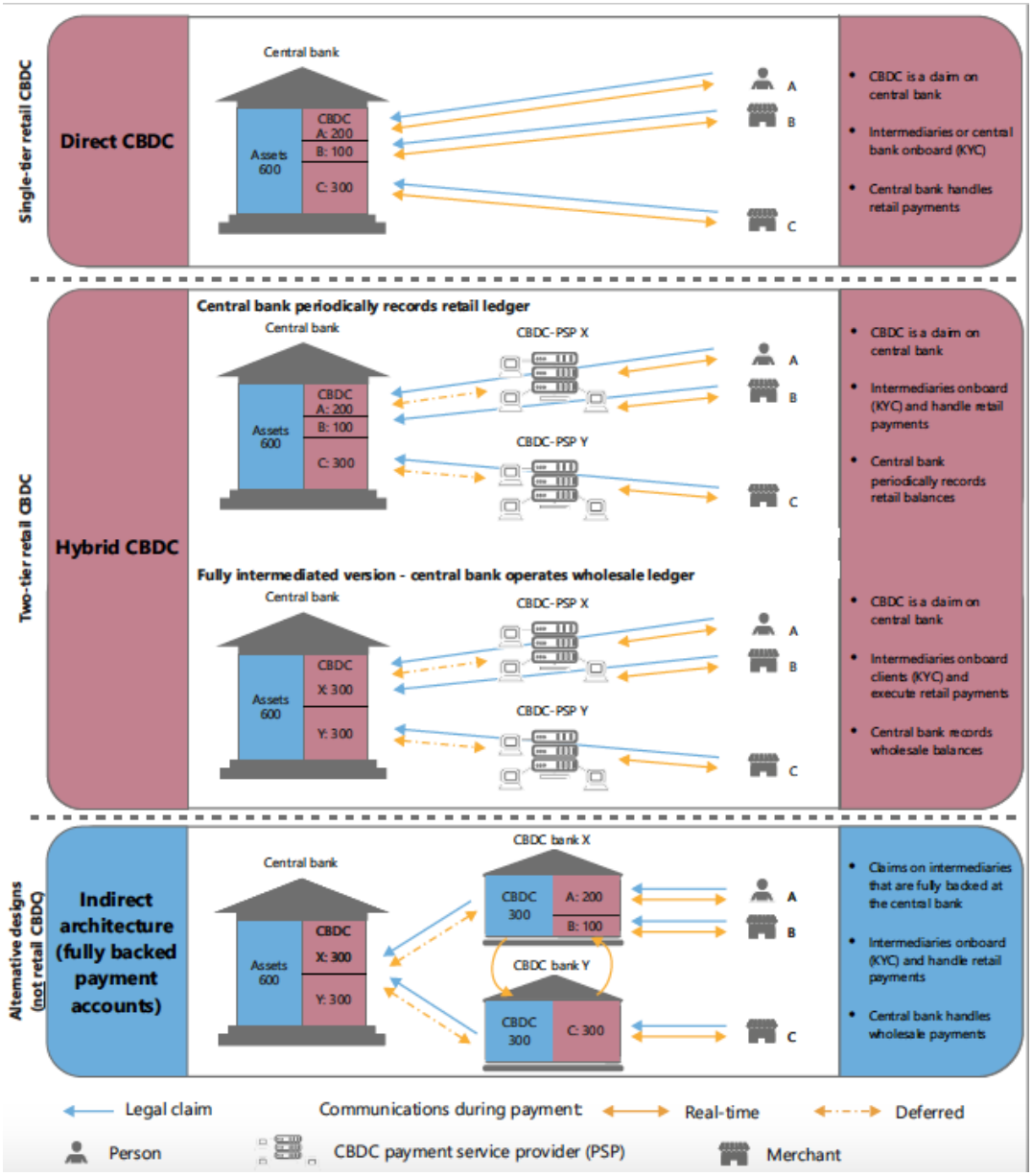
Q7: Hypothetical: Let's say a retail CBDC is launched in a country where there is already a robust IPS in place, we can take any example from Indonesia, Sweden, India. How do you think the retail CBDC would perform?

Appendix 2: IPS Systems list per country

The following report has been summarized according to the countries listed in Table 3 of the text (ACI, 2022):

Country	IPS	Page of Report
Brazil	PIX since 2020	78
Canada	Interac since 2002	15
India	UPI since 2016	60
New Zealand	No System in Place (Only OECD country)	73
Germany	SCT Inst (only backend) since 2017	6
Nigeria	NIP (only backend) since 2011	62
Portugal	MB Way since 2018	49
Sweden	Swish since 2012	51
UK	Faster Payments (only backend) since 2008	54
USA	RPT (only backend) since 2017	16

Appendix 3: Different Types of CBDC



Source: (Auer & Böhme, Central bank digital currency: the quest for minimally invasive technology, 2021)