

ECONOMIC IMPLICATIONS OF DIGITAL CURRENCIES: CHALLENGES AND OPPORTUNITIES IN DEMOGRAPHIC TRANSITION

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Abstract: *In this paper, we explore the economic implications of digital currencies during demographic transition. Through the analysis of the impact on economic patterns and population dynamics, we aim to identify challenges and opportunities in various demographic contexts. Our interdisciplinary approach investigates how digital currencies shape consumption and saving patterns across different demographics, and how this affects economic activity and stability. We also examine their impact on migration patterns and transnational financial flows in an increasingly globalized economy. Moreover, we analyze the socio-economic consequences of adopting digital currencies for older populations and vulnerable groups. By considering factors such as access to technology and financial literacy, we highlight potential policy and practice strategies that can maximize the benefits of digital currencies while minimizing their negative consequences on economic and social equilibrium. Ultimately, our research aims to provide valuable insights that can inform decision-making and contribute to the widespread adoption of digital currencies.*

Key words: *Economics, Digital Currencies, Demographic Transition*

JEL classification: *J11, E0, E7, E52, G20*

1. INTRODUCTION

Digital currencies are the latest direction in the development of modern financial systems (Jakšić et al., 2022).). The rise of digital currencies has created a significant need to talk about their economic impact amid the digital revolution. What's particularly intriguing is how digital currencies intersect with demographic changes, as societies undergo significant shifts in population structures, birth rates, and aging demographics.

This combination presents both challenges and opportunities that require careful analysis.

Digital currencies, such as popular cryptocurrencies like Bitcoin and Ethereum, represent a paradigm shift in financial transactions. Their decentralized nature, facilitated by blockchain technology, challenges the traditional roles of central banks and regulatory authorities (Dimitrijević, 2021). As these currencies gain momentum, they introduce a new dimension to economic dynamics that influences monetary policy, financial stability, and international trade.

However, societies around the world are experiencing demographic changes on an unprecedented scale. Declining birth rates, increasing life expectancy and changing labor force dynamics are shaping the socioeconomic landscape. Such changes pose challenges to traditional economic models, from pension sustainability to health care spending, and require innovative approaches to fiscal policy and social protection.

Against this backdrop, the interplay between digital currencies and demographic transitions becomes increasingly relevant. How do digital currencies affect the financial behavior of different demographic groups? What role do they play in enabling cross-border transactions in aging populations? Can they offer solutions to challenges such as financial inclusion and intergenerational wealth transfer?

Exploring the economic implications of digital currencies within the context of demographic transition reveals a multifaceted landscape that is complex and challenging. This paper aims to delve into the intricacies of this convergence, analyzing the challenges and opportunities it

presents for economies worldwide. By shedding light on these dynamics, we can inform policy discussions and guide strategic decision-making in an era defined by technological innovation and demographic change.

2. THE EMERGENCE AND EVOLUTION OF DIGITAL CURRENCIES

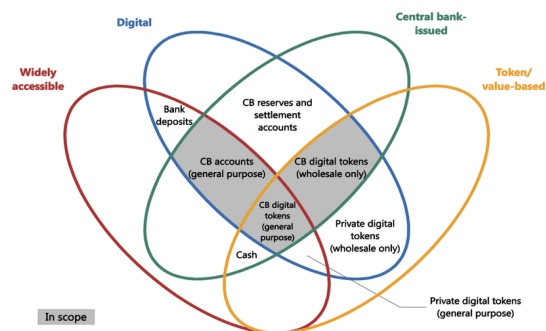
Cryptocurrencies, such as Bitcoin and Ethereum, have gained significant attention from various stakeholders, including investors, policymakers, and financial institutions, due to their increasing adoption since the emergence of Bitcoin in January 2009. Moreover, the academic community has also been showing a keen interest in studying cryptocurrencies (Grujić i Vojinović, 2014). The emergence of digital money has been described as a revolution, with many likening it to the industrial revolutions of the past (Adrian & Mancini-Griffoli, 2019). The new era of digital money has been driven by various factors, including advancements in technology and infrastructure such as crypto algorithms, distributed ledger technology (DLT), and widespread access to communication devices such as smartphones, tablets, and laptops. Additionally, there has been a growing demand for efficient and reliable financial services, as well as a need to respond to changing consumer behavior and evolving expectations. This new era of digital money has the potential to promote financial inclusion for various social and economic groups, including SMEs, previously unbankable individuals, and businesses in areas with limited banking services (IMF, 2020).

The process of development of digital currencies is multifaceted, it includes the emergence, growth and spread of new forms of digital assets used in the exchange of value. Although the origins of digital currencies can be traced back to earlier decades, significant advances in the fields of cryptography and distributed systems have enabled the creation of new decentralized currencies, such as Bitcoin, Ethereum and others. This process consists of several key phases. Firstly, there is a technological transformation that allows for the creation and distribution of digital currencies without traditional intermediaries like banks or central institutions. Subsequently, digital currencies start to gain attention as an alternative to traditional currencies, due to their features like decentralization, transparency, and limited supply (Vujević, 2023). Furthermore, digital currencies expand and are adopted across various sectors of society, including trade, investment, and financial transactions.

During this phase, new technological innovations such as smart contracts and decentralized financial platforms appear, which further enrich the system of digital currencies. Through this process, digital currencies have evolved into a complex and dynamic ecosystem that includes different types of currencies, technologies, platforms and applications. Although digital currencies have brought numerous innovations and changes in the way financial transactions are conducted, they also face challenges such as regulation, security and scalability. Despite all the challenges, the development of digital currencies continues to shape the future of the financial sector and society as a whole.

Cryptocurrencies offer a range of benefits that make them an appealing choice for payment. With the ability to provide a degree of anonymity akin to cash, they offer flexibility and freedom in financial transactions. In addition, the lack of geographical restrictions and the fast settlement of clearing make them ideal for cross-border payments. These advantages, combined with the absence of currency conversion costs, make cryptocurrencies a logical choice for anyone seeking a modern and efficient payment solution.

Figure 1. The classification of money forms based on four key aspects - “money flower”



Source: Cunha, P.R., Melo, P, Sebastião, H. (2021). From Bitcoin to Central Bank Digital Currencies: Making Sense of the Digital Money Revolution. Future Internet 13.

Figure 1 represents two main types of Central Bank Digital Currency (CBDC): retail and wholesale. Retail CBDCs can be account-based or token-based and are accessible to the general public. On the other hand, wholesale CBDCs are digital tokens with limited access that are used in wholesale. For transactions such as interbank payments or securities settlement. Account-based retail CBDCs are like commercial bank accounts, while token-based retail CBDCs are digital cash with similar. The idea of account-based retail CBDCs was proposed by Nobel laureate James

Tobin in the 1980s, who suggested that people should have deposits in the central bank to store value without the risk of bank failure.

3. CHALLENGES AND OPPORTUNITIES OF DIGITAL CURRENCIES

Digital currencies are transforming the modern banking industry. With their growing adoption, they possess the potential to revolutionize monetary policy. It is important for us to embrace the impact of this innovative financial tool and its impact on the banking sector.

The potential of digital currencies, specifically cryptocurrencies such as Bitcoin, to transform our understanding of monetary policy and banking systems cannot be overstated. With the inherent decentralization and security of digital currencies, they offer a myriad of advantages that traditional fiat currencies simply cannot match. The future is now, and it's high time we explore the thrilling possibilities presented by digital currencies (Badawil & Jourdan, 2020).

The widespread adoption of unregulated private mobile money by over 4 billion users, which has facilitated trillions of dollars in financial transactions, has raised concerns about the stability of the monetary system and the decreasing effectiveness of conventional monetary and fiscal policies. As a response, more than 100 central banks across the globe have initiated a concerted effort to develop retail Central Bank Digital Currencies (CBDCs), which will be accessible to all individuals. The primary aim of CBDCs is to provide stability and liquidity to the financial system during times of crisis. However, there remain uncertainties and challenges regarding the successful implementation of monetary and fiscal policies, particularly when it comes to achieving greater fiscal transparency without infringing upon individual rights and privacy (Vujović, 2023). While anticipated enhancements are expected, they may come with inevitable trade-offs in terms of the speed and effectiveness of monetary policy transmission.

According to Obradović et al.'s (2023) research analysis, the current impact of digital currencies on monetary policy is deemed insignificant. However, their potential should not be overlooked, as there is a need for more research and consideration globally. Digital currencies have the ability to influence monetary policy and the banking system in several ways. One significant example is the shift in the total money supply in the economy, whereby traditional money is gradually replaced by digital currencies as a means of payment. This transfer can have an impact on interest rates in the banking system if users decide to withdraw funds from traditional

bank accounts and transfer them to digital currencies. Consequently, this can lead to a decrease in deposits, forcing banks to increase interest rates to attract new deposits or restrict lending, which directly affects monetary policy. The future impact of digital currencies on monetary policy is subject to speculation and cannot be predicted with certainty. However, based on available data and current trends, some tendencies can be identified, primarily in the continued and accelerated development of blockchain and DLT technologies, and the increased influence of digital currencies leading to a redefinition of monetary policy (Tomić & Todorović, 2020). Banks must actively monitor and initiate new research in the field of digital currencies to better understand their future impact on monetary policy. In any case, the development of technology requires alignment of regulatory frameworks and changes in the approach to conducting monetary policy.

Demographic transition refers to the process of changes in the demographic characteristics of a population (Wan Ahmad, Astina & Budijanto, 2015). Typically, it involves a shift from high rates of birth and death to lower rates, leading to changes in the age distribution and other demographic parameters. The process usually involves a decrease in the birth rate, an increase in the average lifespan, urbanization, and changes in social and economic patterns. The connection between demographic transition and cryptocurrencies can be complex and multidimensional (García-Medina & González Fariás, 2020). Here are a few ways in which they can be linked: 1. Financial Inclusion: In countries undergoing demographic transition, there is a need for diverse financial instruments and platforms that enable individuals to manage their finances efficiently and securely. Cryptocurrencies can provide an alternative to traditional banking services and enable greater financial inclusion, especially for those who are less privileged or living in rural areas (Sarma & Pais, 2011). 2. Generational Wealth: Demographic transition can lead to changes in the distribution of wealth between generations. Cryptocurrencies can provide a new way to transfer wealth, especially between older and younger generations. For example, older family members may use cryptocurrencies as a means of transferring inheritance or providing support to younger family members. 3. Global Transactions: In a world where demographic transition often goes hand in hand with globalization, cryptocurrencies can facilitate the transfer of money between different geographical locations. This can be particularly significant for migrants who want to send money home to their families in developing

countries. 4. Fiscal Policy: Changes in demographic characteristics can impact government fiscal policy. Cryptocurrencies, especially if they become part of official transactions, can influence how governments deal with revenues and expenditures, as well as how social programs are planned and implemented. These connections between demographic transition and cryptocurrencies underscore the complexity and diversity of factors shaping modern financial systems and their relationships with broader social and economic changes (Smutny, Sulc & Lansky, 2021).

Adapting regulatory frameworks and institutional infrastructure to cater to changing demographics in the context of cryptocurrencies is a significant challenge. This requires developing new rules and regulations that govern the use of cryptocurrencies in various demographic contexts, taking into account the specificities of different population groups (Badawil and Jourdan, 2020). Ensuring adequate consumer protection and transaction security within the realm of cryptocurrencies is another major challenge, especially considering the evolving demographic structure of users. Therefore, developing effective mechanisms to protect against fraud, identity theft, and other abuses that could jeopardize financial stability and trust in cryptocurrencies is crucial.

Finding a balance between user privacy and the need for transparency and regulation in cryptocurrency transactions is also a key challenge. To achieve this, it is necessary to develop flexible approaches that enable privacy protection while also ensuring transparency and accountability in the use of cryptocurrencies, considering the diverse demographic characteristics and individual preferences of users.

Moreover, educating and raising awareness among users about the potential risks and benefits of using cryptocurrencies in different demographic contexts is essential. This calls for the development of effective educational programs and campaigns that inform users about safe cryptocurrency usage and promote responsible financial behavior across all segments of the demographic population.

Opportunities related to cryptocurrencies are favorable circumstances or potential benefits that can be realized through their use. Here are a few key opportunities to consider (Wilson, 2019):

- **Financial inclusion:** Cryptocurrencies provide an opportunity for those excluded from traditional financial systems to become included. This includes individuals without bank accounts or

access to banking services, as well as residents of rural or less developed areas.

- **Transaction efficiency:** Cryptocurrencies enable fast and inexpensive transactions, especially for international payments. This can be particularly useful for individuals and companies looking to transfer money across borders or avoid high commission and currency conversion costs.
- **Technological innovation:** Cryptocurrencies are associated with blockchain technology, which has a wide range of potential applications in various sectors. This includes areas such as logistics, healthcare, smart contracts, and digital identity.
- **Investment opportunities:** Cryptocurrencies offer the opportunity to invest in new digital currencies or blockchain projects that have the potential for growth and profit. This can attract investors looking for new ways to diversify their portfolios.
- **Enhanced privacy and security:** Certain cryptocurrencies provide a higher level of privacy and security in transactions compared to traditional banking systems. This may be appealing to those who want greater control over their finances and data. In essence, opportunities related to cryptocurrencies represent different ways in which their use can bring benefits to individuals, companies, and society as a whole.

In addition to the advantages mentioned earlier, there are several potential benefits to utilizing cryptocurrencies, including (Hameed, 2019; Al-Omouh, Gomez-Olmedo & Funes 2024):

- **Decentralization:** Cryptocurrencies can function independently without the need for a central authority, such as a government or bank. This can offer users greater control and autonomy while minimizing the risk of corruption or manipulation.
- **Micropayments:** Cryptocurrencies can enable small transactions that would otherwise be impractical or expensive using traditional payment methods. This can facilitate new business models such as pay-per-use services or content monetization.

- **Community building:** Cryptocurrencies can encourage a sense of community among users who share similar values or interests. This can lead to new forms of collaboration, innovation, and social impact.
- **Transparency:** Cryptocurrencies can provide an auditable and transparent record of transactions, helping to prevent fraudulent activities such as money laundering. This can also increase

Overall, the opportunities and benefits of cryptocurrencies are varied and constantly evolving as the technology and its applications continue to evolve. It is critical to carefully weigh the risks and challenges, such as volatility, regulation, and security, to make informed decisions and maximize the potential benefits (Garett, Emish & Young, 2023).

CONCLUSION

In summary, research on the impact of digital currencies amidst demographic changes has shown that there is a complex and dynamic relationship between technological advancements, economic shifts, and demographic transformations. This poses challenges that call for regulatory framework adaptations, institutional infrastructure adjustments, consumer protection and privacy measures, and user education on the potential risks and benefits of using digital currencies.

On the other hand, digital currencies present opportunities that include increased financial inclusion, transaction efficiency, technological innovation, decentralization, micropayments, community building, and transparency. These opportunities can help expand financial services to new segments of the population, facilitate global transactions, encourage innovation across various sectors, and promote accountability and transparency in financial systems.

To harness these opportunities and overcome the challenges, it is crucial to make wise regulatory decisions, develop effective consumer protection and privacy mechanisms, and implement educational programs and campaigns. Constant research and monitoring of trends in the field are also necessary to keep up with changes in demographic characteristics and technological advancements.

Ultimately, digital currencies are a vital aspect of modern financial systems and have the potential to significantly impact economic and social changes. By carefully considering the challenges and opportunities and applying appropriate strategies and measures, we can maximize the benefits of

digital currencies while minimizing their negative effects (Shabbir, Perveen, Dad, Rehman & Ness, 2024).

Given the intricate nature of the interactional process, it is crucial to underscore the fact that digital currencies are just one aspect of the broader range of changes shaping the contemporary financial landscape. As demographic trends shift, digital currencies are increasingly gaining traction in economies across the world, reflecting the changing needs, preferences, and opportunities of various population groups.

To respond adequately to this dynamic, regulatory bodies, financial institutions, and technological companies must align their strategies and practices to effectively tackle the challenges and capitalize on the opportunities presented by this evolving landscape. This necessitates flexibility in policymaking, innovative approaches to consumer protection and innovation promotion, and public education about new financial tools and technologies.

Progress in this area requires the collaboration and partnership of various stakeholders, including government institutions, the private sector, the academic community, and civil society. It is only through joint efforts that a sustainable and inclusive financial ecosystem can be created that benefits all citizens, regardless of their demographic characteristics.

Digital currencies represent a crucial component in the transformation of financial systems worldwide. Their impact will continue to reverberate in the years to come, influencing how people manage their finances, invest their resources, and shape the future of the global economy. As such, continuous research, dialogue, and adaptation are essential to maximize the benefits of these innovations and mitigate their potential risks.

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INTERNET OF THINGS IN THE SERVICE OF DEVELOPING SMART CITIES

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Abstract: *The Internet of Things represents a key technology that contributes to the digital transformation of business and society on a global level. The concept of the Internet of Things is described as a global network that emerges by connecting smart devices via the Internet, enabling their mutual communication, as well as communication with the environment. The subject of this paper is the role of the Internet of Things (IoT) in the development of smart cities. Smart cities represent an innovative approach to urban development aimed at improving the quality of life for citizens, as well as environmental protection. The paper starts from the hypothesis that smart cities today are not only a global trend but also a necessity, as the integration of IoT with existing infrastructure contributes to faster problem-solving and better decision-making that are significant for citizens' lives. The aim of this paper is to present examples of IoT application in the development of smart cities worldwide, as well as in Bosnia and Herzegovina. The research results indicate that the implementation of the concept of smart cities is recognized worldwide, but also that certain cities in Bosnia and Herzegovina have engaged in the process of implementing specific components of smart cities.*

Key words: *Internet of Things, smart cities, technology, technological solutions, Internet, smart devices*

JEL classification: L63

1. INTRODUCTION

The concept of the Internet of Things (IoT) emerged through the connection of objects to the

Internet for the purpose of monitoring new physical states and communicating with other objects and people. This concept transforms physical objects such as various types of devices, vehicles, and the like into "smart" devices, enabling them to be connected and exchange data. The Internet of Things represents a new era of modern technologies, providing companies with the opportunity to reduce costs, increase revenues, transform business operations, discover new value, create new services, and business areas (Tomanović, 2017).

The concept of smart cities has emerged due to the growing trend of urbanization and the increase in urban population. This population growth poses new demands on urban infrastructure, while also raising questions about environmental protection, quality of life, and social inequalities. Nevertheless, cities serve as epicenters of economic, social, and cultural activities, increasingly relying on information and communication technologies to more effectively address these challenges.

The advancement of technology and smart devices, which communicate with each other, has enabled the prediction of consumer needs and the development of solutions to meet them. This also requires businesses to adapt to the new business environment (Tomanović, 2017).

Smart cities utilize digital technologies with the aim of improving the quality of human life and ensuring environmental protection. Additionally, one of the key objectives of smart cities is to attract a large number of new residents and visitors who will invest in the city, leading to an