Determinants of global interest in central bank digital currency: The role of sustainable development and cryptocurrency

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Abstract

Purpose – This paper aims to investigate the determinants of global interest in central bank digital currency (CBDC). It assessed whether global interest in sustainable development and cryptocurrency are determinants of global interest in CBDC.

Design/methodology/approach – Google Trends data were analyzed using two-stage least square regression estimation.

Findings – There is a significant positive relationship between global interest in sustainable development and global interest in CBDC. There is a significant positive relationship between global interest in cryptocurrency and global interest in the Nigeria eNaira CBDC. There is a significant negative relationship between global interest in CBDC and global interest in the eNaira CBDC. There is a significant positive relationship between global interest in CBDC and global interest in the China eCNY. There is a significant negative relationship between global interest in cryptocurrency and global interest in the Sand Dollar and DCash.

Originality/value – The literature has not empirically examined whether global interest in sustainable development and cryptocurrency are factors motivating global interest in CBDC. This study fills a gap in the literature by investigating whether global interest in sustainable development and cryptocurrency are factors motivating global interest in CBDC.

Keywords Sustainable development, SDGs, CBDC, Central bank digital currency, DCash, eNaira, Sand dollar, eCNY, Nigeria, China, Bahamas, Eastern caribbean, Cryptocurrency, Bitcoin, Digital technology

Paper type Research paper

1. Introduction

This study is motivated by the increasing research in the literature about the factors motivating the issuance of a central bank digital currency (CBDC). Scholars have shown that the issuance of a CBDC is motivated by the need to enhance payment efficiency, increase the contestability of payments, improve the conduct of monetary policy, reduce the cost of cash management, increase financial inclusion and the need for central banks to innovate and transform the nature of money (Calle & Eidan, 2020). Other motivations have not been explored such as interest in sustainable development and interest in cryptocurrency, among others. The use of cryptocurrency is increasing in society and many central banks are responding to cryptocurrency either by permitting it, regulating it, placing an outright ban on it or issuing a CBDC to counteract the rise of cryptocurrency (see Kuehnlenz, Orsi, & Kaltenbrunner, 2023; Ozili, 2023a). Also, the need to accelerate sustainable development is giving policymakers and central banks an additional motivation to launch a CBDC that could become a public digital payment tool to channel payments from individuals, firms and government to sustainable

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development projects or activities (Ozili, 2023e). Furthermore, CBDC is becoming popular at a time when there is a surge in cryptocurrencies and a growing interest in achieving the sustainable development goals (SDGs). Despite this trend, the literature has not considered interest in sustainable development and interest in cryptocurrency as potential determinants of interest in CBDC. The lack of research in this area is surprising because existing studies have emphasized the need to develop digital technology and innovations that could speed up the realization of the SDGs (Dell'Erba, 2021; Ozili, 2022), but such studies have not considered whether a CBDC is one of many digital innovations that have emerged in response to the need to speed up the realization of the SDGs. Also, the literature has not extensively examined whether the global interest in CBDCs have emerged in response to the global interest in cryptocurrencies. Motivated by these concerns, this study aims to examine whether global interest in sustainable development and cryptocurrency are determinants of global interest in CBDC.

A CBDC is the digital or virtual equivalent of paper money (Bindseil, 2020). A CBDC is a digital legal tender and a direct liability of the issuing central bank (Jabbar, Geebren, Hussain, Dani, & Ul-Durar, 2023; Ozili, 2023a). This study proposes that CBDCs may have emerged to support the realization of the SDGs. This is because CBDCs are a type of digital financial innovation that can help to speed up the realization of the SDGs by offering low-cost payments and affordable access to a wide range of digital financial services that accelerate the realization of the SDGs. Therefore, the existing global interest in sustainable development may stimulate global interest in CBDC. The study also proposes that interest in cryptocurrency may increase or decrease interest in CBDC. However, these propositions have not been subjected to empirical validation in the literature.

The present study used a unique type of trend data in the absence of publicly available real-time CBDC data. It used global "trend" or "interest over time" data to assess whether global interest in sustainable development and cryptocurrency lead to global interest in CBDC. The analyses were extended to country-specific CBDCs that have been issued recently such as the eCNY in China, the eNaira in Nigeria, the DCash in Eastern Caribbean countries and the Sand Dollar in the Bahamas. Global "interest over time" data were analyzed using the two-stage least square (2SLS) regression methodology. The findings show evidence that interest in sustainable development is a significant positive determinant of interest in CBDC.

The study contributes to the literature in the following way. First, the study contributes to the digital finance literature (see, for example, Arner *et al.*, 2020; Ozili, 2018). The study contributes to the digital finance literature by showing that interest in sustainable development is a significant determinant of interest in digital financial innovations such as a CBDC. Second, the study contributes to the sustainable development literature (see, for example, Bongomin, Yourougou, & Munene, 2019; Yu, Tsai, Jin, & Zhang, 2022). The study contributes to the sustainable development literature by showing that interest in sustainable development is a potential determinant of interest in CBDC. Therefore, policymakers should increase their effort in disseminating information about the need for sustainable development as it can lead to greater interest in CBDC. Finally, the study adds to on-going policy debates about the factors motivating the rise of digital financial innovations. This study empirically shows that interest in sustainable development is one of those factors.

The remainder of the paper is organized in the following way. Section 2 presents the theory, a review of related literature and hypothesis development. Section 3 presents the research methodology. Section 4 presents the empirical results. Section 5 concludes.

2. Theory, literature review and hypothesis development

2.1 Theory

The theoretical relationship between sustainable development and digital financial innovation (e.g., CBDC and cryptocurrency) dates to the work of Schumpeter (1912) who

emphasized the fundamental role of innovation in the development process of a capitalist economy. Schumpeter's theory of innovation argues that the presence of uncertainty in an economy gives innovators an incentive to develop innovations that influence the development of the economic system. Romer (1994) also developed an innovation-growth model where he argued that innovation is the result of efforts by researchers and entrepreneurs who respond to economic incentives, and their innovative ideas often lead to technological changes that contribute positively to growth and development in a society. The implication of these two theories is that innovation is linked to development. These theories support the argument that the need to attain a certain level of development could provide incentives for innovators to develop new innovations, such as CBDC, that help to achieve a sustainable level of development (see Ozili, 2023d).

Also, the diffusion of innovation theory, developed by Roger (2003), describes the pattern and speed at which information about new innovations spread through a population. The theory explores the factors that influence an individual's interest in innovation or new technology (Md Nor, Pearson, & Ahmad, 2010). The theory suggests five factors that influence the adoption of any innovation. They are relative advantage, complexity, compatibility, trial-ability and observability (Md Nor *et al.*, 2010). The theory further argues that information about new innovations is diffused or communicated through certain channels to members of a population (Roger, 2003), and the channel through which information about innovation is communicated can greatly influence people's interest in the innovation. Their response to information about the innovation would give rise to early adopters, early majority adopters, late majority adopters and laggards (Roger, 2003). The implication of the diffusion of innovation theory for this study is that the communication channel – the Internet – plays an important role in influencing people's interest in a particular innovation. This study focused on the "Internet" as the channel through which information about CBDC, cryptocurrency and sustainable development is communicated to members of the population (Ozili, 2023d).

2.2 Literature review

2.2.1 Evolution of CBDC. The evolution of CBDC has its roots in the digital evolution of money which began in the 2000s (Bordo, 2021). During this time, the only central bank money that was widely available to the public was cash, i.e. coins and banknotes. The emergence of digital financial innovations in the 2000s led to the creation of near-money digital financial innovations by private financial intermediaries such as credit cards, debit cards, virtual cards and currency tokens (Bordo, 2021). The wide acceptance of these digital financial innovations led to a decline in the use of physical money as a means of exchange, a surge in online commerce, an increase in contactless forms of payment during the COVID-19 pandemic and the creation and explosive growth of cryptocurrencies also known as private digital currencies (Boar, Holden, & Wadsworth, 2020). These developments led many central banks to rethink the nature of money in the digital ecosystem and devise a way to adapt to these trends to make central bank money relevant and fit for the digital ecosystem (Griffoli *et al.*, 2018; Ozili, 2023a). Several central banks responded to these trends by exploring the possibility of creating a CBDC. For example, the central banks of Netherlands, Canada, Ghana, India, Hong Kong, Singapore, the European Union, Sweden, Japan, the USA and the UK have been researching the concept and design of digital currencies for several years while only few central banks have issued a CBDC such as Nigeria, the Bahamas and Eastern Caribbean.

Regarding CBDC design, the effectiveness of a CBDC depends on its design choices (Ozili, 2023a). A CBDC can be designed as a retail or wholesale CBDC (Auer & Böhme, 2020; Kuehnlenz *et al.*, 2023). A retail CBDC is accessible to the public for use as a general means of

payment, while a wholesale CBDC is available only to eligible financial institutions (Auer & Böhme, 2020; Kuehnlenz *et al.*, 2023). A CBDC can also be designed to be account-based or token-based (Garratt, Lee, Malone, & Martin, 2020; Auer & Böhme, 2020). An account-based CBDC follows the conventional account model that ties ownership to an identity such as a bank account, while token-based CBDC ties ownership to digital tokens (Garratt *et al.*, 2020; Auer & Böhme, 2020; Ozili, 2023b).

In terms of benefits and risks, CBDCs can facilitate instant instantaneous and costless payment, faster cross-border remittances, increase financial inclusion for the unbanked and reduce illicit activities, but they also result in the loss of some privacy (Jabbar *et al.*, 2023; Kuehnlenz *et al.*, 2023; Mancini-Griffoli *et al.*, 2018). CBDC can also be designed to be interest-bearing or non-interest-bearing (Ozili, 2023b). An interest-bearing CBDC can be used as a monetary policy tool to control inflation and mitigate financial stability risks (Ozili, 2023b), while a non-interest-bearing CBDC can be used to enhance fiscal policy effectiveness if CBDCs are used to facilitate government payments and monitor government spending (Ozili, 2023b). Furthermore, the need to increase financial inclusion, shrink the size of the informal economy and reduce illicit economic activities are often considered to be the major reasons for issuing a CBDC in developing countries (Ozili, 2023a), while the need to reduce transaction costs and facilitate efficient cross-border payments are often considered to be the major reasons for issuing a CBDC in developed countries (Ozili, 2023a).

2.2.2 Use case, benefits and risks of CBDC. Several studies in the CBDC literature discuss the use case, benefits and risks of issuing a CBDC. For instance, Bordo and Levin (2017) showed that an account-based and interest-bearing CBDC can serve as a costless medium of exchange, secure store of value and stable unit of account. Bech and Garratt (2017) argued that, although CBDC can allow consumers to hold central bank liabilities in digital form which means that the public would be allowed to have central bank account, all central banks may eventually have to decide whether issuing retail or wholesale CBCCs makes sense in their own context, and they will also need to consider consumer preferences for privacy, the efficiency gains of issuing a CBDC and the risks it may entail for the financial system and the wider economy. Mancini-Griffoli *et al.* (2018) argued that the demand for CBDCs will not necessarily be very high and will depend on the attractiveness of alternative forms of money; however, they urged central banks to consider their specific country circumstances and pay careful attention to the CBDC risks and potential benefits while being mindful of the technological requirement and operational costs to issue and sustain a CBDC. In a survey of CBDC adoption, Boar *et al.* (2020) showed that central banks are undertaking extensive work on CBDCs, and many central banks say they are likely to issue a CBDC in the next few years. Andolfatto (2021) examined the impact of CBDC on banks in a model where the banking sector that is not perfectly competitive and found that the introduction of interest-bearing CBDC increases financial inclusion and diminishes the demand for cash; however, the introduction of interest-bearing CBDC may not disintermediate banks rather it can expand the depositor base of banks if the added competition compels banks to raise their deposit rates. Jabbar *et al.* (2023) focused on privacy disclosures. They used privacy calculus theory to examine the potential benefits of CBDC and how these influence user perceptions toward privacy disclosure. They found that many people were willing to offset privacy disclosure concerns if there are significant benefits in CBDC usage such as ease of use, convenience, availability and credibility. Ozili (2023a) reviewed the existing literature and found that some motivations for issuing a CBDC are to improve the conduct of monetary policy, enhance the efficiency of digital payments and increase financial inclusion. While these studies show the use case, benefits and risks of CBDC, these studies did not empirically examine whether global interest in sustainable development and cryptocurrency leads to global interest in CBDC.

2.2.3 CBDC and cryptocurrency. Other studies compare CBDCs with cryptocurrencies. Studies such as Gupta (2021) argued that cryptocurrency and CBDCs have very little in common due to their primary structural differences; however, CBDCs have a greater advantage than cryptocurrency because CBDCs have the potential to improve monetary policy transmission and financial inclusion which is not possible with cryptocurrency. Yousaf and Goodell (2023) show that cryptocurrencies are related to CBDCs because they are alternative payment options, and cryptocurrencies provide privacy benefits which CBDCs do not fully provide. Some studies, such as Fuchs (2022), Gupta (2021) and Ozili (2023b), argued that CBDCs are superior to cryptocurrencies. Fuchs (2022) argued that private cryptocurrencies allow for payments without the need for a financial institution or the central bank, but central banks can introduce an interest-bearing CBDC and provide a payment system which is superior to cryptocurrencies because cryptocurrency miners cannot match the CBDC interest rate; if they do, they will go bankrupt. Kuehnlenz *et al.* (2023) also argued that cryptocurrencies cannot be relied on as a medium of exchange because it fails to perform the functions of money. In a different study, Ozili (2023b) examined the role of cryptocurrency for financial inclusion and financial stability and showed that cryptocurrencies are very risky because they do not present any immediate or long-term benefit for financial inclusion and financial stability. While these studies compare CBDCs and cryptocurrencies, these studies did not empirically examine whether global interest in sustainable development and cryptocurrency leads to global interest in CBDC.

2.2.4 Impact of digital financial innovations on sustainable development. Some studies associate digital financial innovations with sustainable development. For example, Piliyanti (2019) suggests that Fintech innovations, such as crowdfunding, can be used to finance sustainable development activities in Indonesia. Another empirical study, Deng, Huang, and Cheng (2019) analyzed the relationship between Fintech and sustainable development based on data of peer-to-peer platforms (P2P) in 31 Chinese provinces. They found a strong positive relationship between Fintech and sustainable development. In a cross-country study, Banna, Hassan, and Alam (2020) argued that digital financial inclusion can contribute to sustainable economic growth which is a step toward achieving the SDGs. Moşteanu (2020) showed that digital financial innovations can support clean sustainable development. They argued that digital financial innovations can support the development of blended finance for the creation of smart cities and promote secure financial services and bank transfers using digital financial instruments, products and services. Leong, Sung, and Teissier (2021) argued that partnership plays an important role in promoting Fintech initiatives for sustainable development. They showed that Fintech developments can enhance financial inclusion, improve lending decision-making, provide alternative investment opportunities, mobilize capital market funds, reduce transaction cost and improve fund transfer efficiency, toward achieving sustainable development. In an empirical study, Banna and Alam (2021) examined the effect of digital financial inclusion on sustainable economic development. They analyzed 574 banks from seven emerging Asian countries from 2011 to 2018 and found that digital financial inclusion increases sustainable economic development, which contributes to achieving the SDGs by 2030. Buckley, Zetzsche, Arner, and Veidt (2021) argued that central banks and financial regulators around the world can promote sustainable development in the context of their wider mandates. They argued that central banks can use digital finance and Fintech innovations to support efforts to achieve the SDGs by promoting monetary stability, financial stability, financial integrity and consumer protection. In the context of organizations, George, Merrill, and Schillebeeckx (2021) explored how digital technologies can help tackle climate change and promote sustainable development. They showed that digital technologies can help entrepreneurial organizations adopt innovative approaches to tackle sustainable development challenges. While these studies show the impact of digital financial innovations on sustainable development, these studies did not empirically examine whether global interest in sustainable development and cryptocurrency leads to global interest in CBDC.

2.2.5 Impact of digital currencies on sustainable development. Few studies examined the role of blockchain and digital currencies in promoting sustainable development. Nguyen (2016) stated that blockchain can play an important role in sustainable development by providing transaction transparency and privacy benefits when conducting transactions in society. ESCAP (2017) assessed how digital currencies can support the SDGs. The author argued that digital currency allows for cheaper and more efficient money transfers, thereby alleviating global remittance costs. The author also argued that digital currency fosters favorable conditions for e-commerce, entrepreneurship and international trade. The author further argued that digital currencies delivered using mobile banking technology can help to lower the cost of money transfers and contribute to financial inclusion toward sustainable development. Giménez and Tamajón (2019) were interested in understanding why local digital currencies have not been implemented in society. They showed that people's perceptions, beliefs and previous experiences significantly influence people's intention to be part of a community based on a local digital currency. They also showed that local digital currencies can be used for privately negotiated payments between individuals and businesses. Vaz and Brown (2020) assessed the sustainability issues facing cryptocurrencies in their functions as digital private money. They pointed out that cryptocurrencies consume a lot of energy to mine cryptocurrencies, which makes it contrary to the goals of promoting clean energy. Ozili (2022) argued that CBDC can make an important contribution to sustainable development by supporting the transition to a circular economy. The author showed that central banks can contribute to the circular economy transition by making CBDC accessible to circular businesses and by looking into how the design features of CBDC can support circular economy goals. While these studies show the impact of digital currencies on sustainable development, these studies did not empirically examine whether global interest in sustainable development and cryptocurrency lead to global interest in CBDC.

2.3 Hypothesis development

Theoretical studies show that innovations can emerge in response to development needs (e.g., Schumpeter, 1912; Romer, 1994). This study argues that digital financial innovations can emerge in response to sustainable development needs. The need to achieve the SDGs can lead to the emergence of digital financial innovations that improve payments and increase access to finance for everyone. An example of such digital financial innovation is a CBDC. When central banks are pressured to contribute to the realization of the SDGs, they can respond by offering a CBDC. Central banks can design the CBDC in a way that supports the attainment of one or more SDGs. For example, central banks can ensure that the CBDC offers low-cost payments and increases access to a wide range of formal financial services that can be used to accelerate the realization of the SDGs. Therefore, the growing interest in sustainable development may stimulate interest in CBDC especially if a CBDC can be designed to support the attainment of one or more SDGs. Therefore, the expectation is that global interest in sustainable development may be positively related to global interest in CBDC.

H1. Global interest in sustainable development is positively related to global interest in CBDC.

Also, the rise in cryptocurrency and its associated risks can compel policymakers and central banks to respond either by allowing it to coexist with other payment alternatives in a regulated environment, banning all cryptocurrencies in a country or by issuing a CBDC to counteract the rise in cryptocurrencies (Kuehnlenz *et al.*, 2023; Ozili, 2023a). Therefore, it is possible that the rise in the use of cryptocurrencies in a country can motivate the central bank to respond by developing an interest in issuing a CBDC. This can lead to increased interest in CBDC among the population when the central bank announces its interest in issuing a CBDC.

Therefore, the growing interest in cryptocurrency can stimulate interest in CBDC. Therefore, the expectation is that global interest in cryptocurrency may be positively related to global interest in CBDC.

H2. Global interest in cryptocurrency is positively related to global interest in CBDC.

3. Research methodology

3.1 Data

3.1.1 The sample. This study used data obtained from Google Trends database. Google Trends data capture the "interest over time" in specific search terms over the Internet. Google Trends data are generated from the search people make on Google about specific terms such as "CBDC," "sustainable development" and "cryptocurrency." The data reflect people's interest in the search term over a specific period. Existing studies have also used Google Trends data to examine economic relationships such as Borup and Schütte (2022) and Ozili (2023c), among others. Daily global [1] trend data for web search keywords were collected from Google Trends database for the period 01/11/2021 to 04/05/2022 (i.e., from 1st November 2021 to 4th May 2022. The following specific search terms were inserted into the Google Trends search box: "central bank digital currency," "CBDC," "e-CNY," "eCNY," "sustainable development (SD)," "sustainable development goals (SDGs)," "cryptocurrency," "eNaira," "DCash" and "Sand Dollar." The resulting time series trend data measure the worldwide popularity of each search term. See Table 1 for the description of the variables and see Appendix 1 for the list of countries in the global sample.

3.1.2 Descriptive statistics. The descriptive statistic is reported in Table 2. The mean statistic shows that there was high global interest in cryptocurrency during the period, followed by global interest in sustainable development. This indicates that there was more Google search for cryptocurrency information than any of the five topics. Meanwhile, interest in eNaira and Sand Dollar had the lowest popularity during the period while the e-CNY and DCash had moderate popularity during the period.

Variable	Meaning
Global interest in CBDC1	Web search for the term "central bank digital currency" on Google Trends database
Global interest in CBDC2	Web search for the term "CBDC" on Google Trends database
Global interest in eCNY1	Web search for the term "e-CNY" on Google Trends database. The e-CNY is the local central bank digital currency in China
Global interest in eCNY2	Web search for the term "eCNY" on Google Trends database. The eCNY is the local central bank digital currency in China
Global interest in SD	Web search for the term "sustainable development" on Google Trends database
Global interest in the SDGs	Web search for the term "sustainable development goals" on Google Trends database
Global interest in cryptocurrency	Web search for the term "cryptocurrency" on Google Trends database
Global interest in eNaira	Web search for the term "eNaira" on Google Trends database. The eNaira is the local central bank digital currency in Nigeria
Global interest in DCash	Web search for the term "DCash" on Google Trends database. The Dcash is the local central bank digital currency in the Eastern Caribbean Central Bank
Global interest in Sand Dollar	Web search for the term "Sand Dollar" on Google Trends database. The Sand Dollar is the local central bank digital currency in the Bahamas

Source(s): Google Trends

Table 1.
Variable description

3.1.3 Pearson correlation. The Pearson correlation matrix for the variables is reported in Table 3. Global interest in CBDC is significant and positively correlated with global interest in sustainable development, cryptocurrency, DCash, eNaira and Sand Dollar. This result suggests that greater global interest in CBDC is correlated with greater global interest in sustainable development, cryptocurrency, DCash, eNaira and Sand Dollar. In contrast, global interest in CBDC is significant and negatively correlated with interest in e-CNY. This result suggests that greater global interest in CBDC is correlated with lower interest in e-CNY. Overall, the correlation coefficients are less than 70%, therefore, multi-collinearity is not a problem in the analysis.

3.2 Estimation method

Time series Google Trends data [2] were analyzed using the 2SLS regression estimation method. The 2SLS estimations were used because the ordinary least square regression methodology does not address the problem of endogeneity in the data, and the independent variables may be correlated with the residuals, which could give rise to spurious regression. To address this problem and obtain reliable estimates, the 2SLSL regression method was used to investigate the determinants of global interest in CBDC in general, and the determinants of global interest in country-specific CBDC such as the Bahamas "Sand Dollar," the Eastern Caribbean "DCash," the Nigeria "eNaira" and the China digital yuan also known as the e-CNY or eCNY. The model used to investigate the determinants of global interest in CBDC is shown in equation (1), while the model used to estimate the determinants of global interest in the country-specific CBDC is shown in equation (2).

$$\begin{aligned}&[Interest\,in\,CBDC\,(or\,central\,bank\,digital\,currency)]t\\&=c+[Interest\,in\,SD\,(or\,Interest\,in\,SDGs)]t+[Interest\,in\,e-CNY\,(or\,Interest\,in\,eCNY)]t\\&\quad+[Interest\,in\,eNaira]t+[Interest\,in\,DCash]t+[Interest\,in\,Sand\,Dollar]t\\&\quad+[Interest\,in\,Cryptocurrency]t+e\end{aligned}\tag{1}$$

$$\begin{aligned}&[Interest\,in\,eNaira\,(or\,eCNY, DCash, SandDollar)]t\\&=c+[Interest\,in\,SD\,(or\,Interest\,in\,SDGs)]t+[Interest\,in\,e-CNY\,(or\,Interest\,in\,eCNY)]t\\&\quad+[Interest\,in\,eNaira]t+[Interest\,in\,DCash]t+[Interest\,in\,Sand\,Dollar]t\\&\quad+[Interest\,in\,Cryptocurrency]t+e\end{aligned}\tag{2}$$

Table 2. Summary of descriptive statistics for the variables

Statistic	Interest in cryptocurrency	Interest in CBDC	Interest in SD	Interest in eNaira	Interest in DCash	Interest in sand dollar	Interest in e-CNY
Mean	89	69	72	54	63	58	64
Median	71	56	69	52	51	53	58
Standard deviation	2.34	3.41	0.67	0.87	2.14	1.78	1.55
Observations	212	212	212	212	212	212	212

Source(s): Author's computation using Google Trends data

Variables	Interest in CBDC	Interest in SD	Interest in cryptocurrency	Interest in DCash	Interest in eNaira	Interest in sand dollar	Interest in e-CNY
Interest in CBDC	1.000						
Interest in SD	0.685***	1.000					
	(0.000)						
Interest in cryptocurrency	0.445***	0.211	1.000				
	(0.000)	(0.599)					
Interest in DCash	0.565***	0.341***	0.485**	1.000			
	(0.000)	(0.000)	(0.000)				
Interest in eNaira	0.422***	0.233***	−0.108***	0.336***	1.000		
	(0.004)	(0.000)	(0.004)	(0.000)			
Interest in Sand Dollar	0.394***	0.402*	0.255***	0.411***	0.412***	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Interest in e-CNY	−0.515***	0.131	−0.277***	−0.233***	−0.566***	−0.452***	1.000
	(0.000)	(0.911)	(0.000)	(0.000)	(0.000)	(0.000)	

Note(s): *, ** and *** represent statistical significance at the 10%, 5% and 1% level. The *P*-values are reported in parenthesis
Source(s): Author's computation

Table 3.
Pearson correlation for the variables

4. Empirical results

4.1 Determinants of global interest in central bank digital currency

The 2SLS regression estimation was used to investigate the determinants of global interest in CBDC. The results are reported in Table 4. The SD coefficient is significant and positive in Columns 1, 2, 5 and 6 of Table 4. This indicates that global interest in sustainable development has a significant positive effect on global interest in CBDC during the period. The SDG coefficient is also significant and positive in Columns 3, 4, 7 and 8 of Table 4. This also indicates that global interest in the SDGs has a significant positive effect on global interest in CBDC. The two results show a significant positive relationship between global interest in sustainable development and global interest in CBDC. It also shows a positive relationship between global interest in the SDGs and global interest in CBDC.

4.2 Additional analysis

4.2.1 Determinants of global interest in eNaira CBDC. This section presents the results for the determinants of global interest in the eNaira CBDC. The 2SLS regression estimation results are reported in Table 5. The results in Columns 3 and 4 show that global interest in CBDC (CBDC2) is significant and inversely related to global interest in eNaira. This indicates that higher global interest in CBDC leads to lower global interest in eNaira. Also, the regression results in Columns 1 and 2 show that global interest in cryptocurrency is significant and positively related to global interest in eNaira. This indicates that higher global interest in cryptocurrency leads to greater global interest in eNaira. This result suggests that the global interest in cryptocurrency was responsible for the growing global interest in the eNaira CBDC. In contrast, global interest in sustainable development or the SDGs did not have a significant effect on global interest in eNaira as shown in Columns 1–4 of Table 5. Overall, the findings show that the main determinants of global interest in the eNaira are the global interest in cryptocurrencies and the global interest in CBDC.

4.2.2 Determinants of global interest in eCNY. This section examines the determinants of global interest in the eCNY CBDC. The 2SLS regression results are reported in Table 6. It shows that global interest in CBDC2 is significant and positively related to global interest in eCNY. This indicates that higher global interest in CBDC leads to greater global interest in the eCNY. The result suggests that global interest in CBDC is potentially responsible for the growing global interest in eCNY. In contrast, global interest in sustainable development, the SDGs and cryptocurrencies have an insignificant effect on global interest in eCNY as shown in Columns 1–4 of Table 6. Overall, the findings suggest that the motivation to issue the eCNY in China was due to the growing interest in CBDC.

4.2.3 Determinants of global interest in Sand Dollar CBDC. This section examines the determinants of global interest in the Sand Dollar CBDC. The 2SLS regression results in Table 7 show that global interest in cryptocurrency is significant and inversely related to global interest in the Sand Dollar. This indicates that greater global interest in cryptocurrency leads to lower global interest in the Sand Dollar. This also implies that greater global interest in cryptocurrency leads to a significant decrease in global interest in the Sand Dollar. In contrast, global interest in sustainable development did not have a significant effect on global interest in the Sand Dollar as shown in Columns 1–4 of Table 7. Overall, the findings suggest that a motivation to issue the Sand Dollar was to counter the competition from cryptocurrency.

4.2.4 Determinants of global interest in DCash. This section examines the determinants of global interest in DCash. The 2SLS regression results in Table 8 show that global interest in cryptocurrency is significant and inversely related to global interest in DCash. This indicates that greater global interest in cryptocurrency leads to lower global interest in DCash. The result implies that high global interest in cryptocurrency leads to a significant decrease in

	(1) Dependent variable Interest in CBDC1 Coefficient (*t*-statistic)	(2) Dependent variable Interest in CBDC1 Coefficient (*t*-statistic)	(3) Dependent variable Interest in CBDC1 Coefficient (*t*-statistic)	(4) Dependent variable Interest in CBDC1 Coefficient (*t*-statistic)	(5) Dependent variable Interest in CBDC2 Coefficient (*t*-statistic)	(6) Dependent variable Interest in CBDC2 Coefficient (*t*-statistic)	(7) Dependent variable Interest in CBDC2 Coefficient (*t*-statistic)	(8) Dependent variable Interest in CBDC2 Coefficient (*t*-statistic)
C	7.536 (0.99)	8.043 (1.06)	8.056 (1.19)	8.795 (1.30)	7.290 (1.09)	8.446 (1.23)	15.342** (2.50)	16.989*** (2.69)
Interest in SD	0.233*** (3.14)	0.245*** (3.29)			0.440*** (6.71)	0.462*** (6.84)		
Interest in SDG			0.231*** (3.88)	0.240*** (4.02)			0.338*** (6.24)	0.354*** (6.33)
Interest in e-CNY	0.052 (0.95)		0.049 (0.92)		0.154*** (3.19)		0.159*** (3.26)	
Interest in eCNY		−0.017 (−0.38)		−0.021 (−0.45)		0.018 (0.44)		0.021 (0.49)
Interest in eNaira	−0.074 (−0.80)	−0.017 (−0.37)	−0.077 (−0.85)	−0.089 (−0.97)	−0.182** (−2.22)	−0.198 (−2.33)	−0.184** (−2.21)	−0.199** (−2.32)
Interest in DCash	−0.026 (−0.41)	−0.024 (−0.37)	−0.021 (−0.34)	−0.019 (−0.29)	−0.006 (−0.10)	0.0003 (0.004)	−0.003 (−0.05)	0.003 (0.06)
Interest in sand dollar	0.003 (0.03)	0.0001 (0.001)	0.022 (0.23)	0.019 (0.20)	−0.074 (−0.85)	−0.079 (−0.89)	−0.057 (−0.65)	−0.063 (−0.69)
Interest in cryptocurrency	−0.130 (−1.18)	−0.131 (−1.19)	−0.117 (−1.07)	−0.117 (−1.07)	0.169* (1.74)	0.158 (1.58)	0.185* (1.87)	0.174* (0.09)
R^2 (%)	8.67	8.28	11.12	10.79	27.83	23.79	25.79	21.47
Adjusted R^2 (%)	5.59	5.19	8.12	7.78	25.39	21.22	23.29	18.82
F-Statistic	2.81	2.679	3.71	3.59	11.44	9.25	10.31	8.109
P(*F*-Statistic)	0.012	0.016	0.002	0.002	0.000	0.000	0.000	0.000

Note(s): The instruments used in the 2SLS estimation are the lagged explanatory variables. *T*-statistic is reported in parenthesis. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels

Source(s): Author's computation

Table 4.
Baseline result – determinants of global interest in central bank digital currency (two-stage least square regression estimation)

Dependent variable: eNaira	(1) Coefficient (*t*-statistic)	(2) Coefficient (*t*-statistic)	(3) Coefficient (*t*-statistic)	(4) Coefficient (*t*-statistic)
C	−6.755 (−1.48)	−6.661* (−1.83)	−6.210 (−1.38)	−4.824 (−1.30)
Interest in CBDC1	−0.053 (−0.88)	−0.059 (−0.96)		
Interest in CBDC2			−0.151** (−2.30)	−0.151** (−2.34)
Interest in SD	0.039 (0.65)		0.097 (1.46)	
Interest in the SDG		0.044 (0.87)		0.084 (1.58)
Interest in cryptocurrency	0.702*** (9.88)	0.702*** (9.88)	0.718*** (10.35)	0.719*** (10.38)
R^2 (%)	36.50	36.62	38.05	38.17
Adjusted R^2 (%)	35.45	35.57	37.02	37.14
F-Statistic	34.68	34.87	37.05	37.246
P(*F*-Statistic)	0.000	0.000	0.000	0.000

Note(s): The instruments used in the 2SLS estimation are the lagged explanatory variables
T-statistic is reported in parenthesis. ***, **, * represent statistical significance at the 1%, 5% and 10% levels
Source(s): Author's computation

Table 5.
Determinants of global interest in the eNaira (two-stage least square regression estimation)

global interest in DCash. In contrast, global interest in sustainable development and CBDC did not have a significant effect on global interest in DCash as shown in Columns 1–4 of Table 8.

5. Conclusion

This paper examined the determinants of global interest in CBDC. It assessed whether global interest in sustainable development and cryptocurrency are significant factors leading to global interest in CBDC. The analyses were conducted using 2SLSL regression estimation.

The findings reveal a significant positive relationship between global interest in sustainable development (and the SDGs) and global interest in CBDC. There is a significant positive relationship between global interest in cryptocurrency and global interest in the eNaira, while there is a significant negative relationship between global interest in CBDC and global interest in the eNaira. There is a significant positive relationship between global interest in CBDC and global interest in the eCNY. There is a significant negative relationship between global interest in cryptocurrency and global interest in the Sand Dollar and DCash. Also, global interest in sustainable development did not have a significant effect on global interest in the eNaira, DCash, eCNY and the Sand Dollar.

The implication of the findings is that the global interest in CBDC was largely caused by the global interest in sustainable development. However, the interest in country-specific CBDCs (e.g., eNaira, Sand Dollar and DCash) appears to be motivated by the interest in cryptocurrency.

The practical implication is that central banks need to recognize and develop a synergistic interaction between CBDC and the realization of the SDGs, and central banks should reflect such synergies in their CBDC-related central bank communications. Another implication is that central banks should determine the CBDC design choices that would support the attainment of one or more SDGs. Furthermore, the United Nations can support central banks by developing a strategic guidance document that clearly spells out the roles that CBDCs could play in accelerating the realization of the SDGs. Central banks can use such guidance documents to develop country-specific CBDC use cases that lead to better sustainable

	Dependent variable: e-CNY				Dependent variable: eCNY			
	(1) Coefficient (*t*-statistic)	(2) Coefficient (*t*-statistic)	(3) Coefficient (*t*-statistic)	(4) Coefficient (*t*-statistic)	(5) Coefficient (*t*-statistic)	(6) Coefficient (*t*-statistic)	(7) Coefficient (*t*-statistic)	(8) Coefficient (*t*-statistic)
c	8.089 (1.06)	11.496* (1.88)	6.579 (0.89)	6.658 (1.09)	5.112 (0.52)	9.922 (1.37)	5.216 (0.57)	7.869 (1.06)
Interest in CBDC1	0.102 (1.01)	0.102 (0.99)			−0.035 (−0.29)	−0.040 (−0.32)		
Interest in CBDC2			0.362*** (3.36)	0.365*** (3.44)			0.099 (0.75)	0.106 (0.82)
Interest in SD	0.134 (1.29)		−0.010 (−0.09)		0.214 (1.58)		0.145 (1.08)	
Interest in the SDGs		0.092 (1.08)		−0.014 (−0.16)		0.159 (1.58)		0.112 (1.05)
Interest in cryptocurrency	−0.137 (−1.16)	−0.135 (−1.14)	−0.170 (−1.49)	−0.171 (−1.49)	−0.086 (−0.61)	−0.083 (−0.58)	−0.083 (−0.59)	−0.080 (−0.57)
R^2 (%)	2.802	2.53	8.02	8.01	1.59	1.52	1.86	1.82
Adjusted R^2 (%)	1.19	0.91	6.47	6.49	−0.04	−0.11	0.24	0.19
F-Statistic	1.739	1.565	5.247	5.25	0.932	0.932	1.149	1.121
P(*F*-Statistic)	0.161	0.199	0.002	0.002	0.426	0.427	0.331	0.342

Note(s): The instruments used in the 2SLS estimation are the lagged explanatory variables. *T*-statistic is reported in parenthesis. *** and * represent statistical significance at the 1% and 10% levels

Source(s): Author's computation

Table 6.
Determinants of global interest in the eCNY (two-stage least square regression estimation)

Dependent variable: Sand dollar	(1) Coefficient (*t*-statistic)	(2) Coefficient (*t*-statistic)	(3) Coefficient (*t*-statistic)	(4) Coefficient (*t*-statistic)
c	45.778 (10.69)	45.755*** (13.39)	46.033*** (10.77)	46.214** (13.17)
Interest in CBDC1	0.009 (0.17)	0.022 (0.39)		
Interest in CBDC2			−0.028 (−0.46)	−0.016 (−0.26)
Interest in SD	−0.075 (−1.30)		−0.059 (−0.94)	
Interest in the SDGs		−0.087* (−1.83)		−0.076 (−1.51)
Interest in cryptocurrency	−0.291*** (−4.36)	−0.290*** (−4.37)	−0.292*** (−4.43)	−0.294*** (−4.47)
R^2 (%)	10.68	11.48	10.77	11.44
Adjusted R^2 (%)	9.20	10.01	9.29	9.97
F-Statistic	7.22	7.83	7.28	7.79
P(*F*-Statistic)	0.000	0.000	0.000	0.000

Note(s): The instruments used in the 2SLS estimation are the lagged explanatory variables. *T*-statistic is reported in parenthesis. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels
Source(s): Author's computation

Table 7.
Determinants of global interest in the Sand Dollar (two-stage least square regression estimation)

Dependent variable: DCash	(1) Coefficient (*t*-statistic)	(2) Coefficient (*t*-statistic)	(3) Coefficient (*t*-statistic)	(4) Coefficient (*t*-statistic)
c	41.105*** (6.35)	40.836*** (7.88)	40.795*** (6.31)	40.022*** (7.15)
Interest in CBDC1	−0.028 (−0.32)	−0.022 (−0.24)		
Interest in CBDC2			0.016 (0.17)	0.017 (0.18)
Interest in SD	−0.047 (−0.54)		−0.061 (−0.64)	
Interest in the SDGs		−0.049 (−0.69)		−0.055 (−0.64)
Interest in Cryptocurrency	−0.346*** (−3.42)	−0.345*** (−3.42)	−0.341*** (−3.42)	−0.342*** (−3.43)
R^2 (%)	6.34	6.43	6.29	6.42
Adjusted R^2 (%)	4.79	4.88	4.75	4.87
F-Statistic	4.08	4.148	4.056	4.061
P(*F*-Statistic)	0.008	0.007	0.008	0.008

Note(s): The instruments used in the 2SLS estimation are the lagged explanatory variables. *T*-statistic is reported in parenthesis. *** represents statistical significance at the 1% level
Source(s): Author's computation

Table 8.
Determinants of global interest in DCash (two-stage least square regression estimation)

development outcomes in their countries. Central banks also need to think about how CBDCs might co-exist with cryptocurrency in a safe and regulated environment.

One limitation of the study is that the study used trend data based on Google web search. The data are based on people's interest in a search term or keyword over the Internet which may be subjective. This issue is further worsened by the fact that there is presently no comprehensive database about CBDC growth since many countries have not adopted CBDC. Another limitation of the study is that some people searching for CBDC or sustainable development information on the Internet using Google may be doing so due to doubt about CBDC or sustainable development. It is also possible that the Google Trends data could reflect

irregular search activity, such as automated searches or queries that may be associated with attempts to spam the search results. Another limitation of the study is that the Google Trends data may not capture the interest in CBDC, sustainable development and cryptocurrency in countries that do not have access to Google.

Future research can reexamine the determinants of global interest in CBDC when more data becomes available. Future studies can also examine how specific indicators of sustainable development affect global interest in CBDC. Future research studies can use social media data to examine the determinants of global interest in CBDC. Future studies can also assess whether the presence of better institutions and political governance leads to greater interest in CBDC.

The paper is available here: https://www.bankofengland.co.uk/paper/2023/the-digital-pound-consultation-paper.

Notes

1. See Appendix 1 for a list of countries in the global sample.
2. The Trends data used in this study is different from the survey data used by the Bank of England in its CBDC consultation paper. The Bank of England in early 2022 commissioned YouGov and London Economics to carry out market research on payment preferences and behaviours to determine the readiness for CBDC adoption. The research comprised quantitative surveys issued to consumers and small and medium-sized enterprises.

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(The Appendix follows overleaf)

Appendix 1

Google trends search category	Countries
Web search	Zimbabwe, Eswatini, Rwanda, Uganda, Zambia, Fiji, Nigeria, Ghana, Ethiopia, Tanzania, Kenya, India, Cameroon, Nepal, Bangladesh, Mauritius, Cambodia, Singapore, South Africa, Philippines, Pakistan, Lebanon, Sri Lanka, Jordan, Malaysia, Bolivia, Egypt, Hong Kong, United Arab Emirates, United Kingdom, Indonesia, Switzerland, Australia, South Korea, USA, Thailand, Netherlands, Canada, Vietnam, Saudi Arabia, Mexico, Norway, Germany, France, Spain, Japan Russia, Iran, Brazil, Marshall Islands, Micronesia, Tonga, Vanuatu, Eritrea, Solomon Islands, Samoa, American Samoa, Lesotho, Papua New Guinea, Palau, Sierra Leone, Malawi, Bhutan, Guinea-Bissau, Greenland, Burundi, Seychelles, Gambia, Mayotte, Liberia, Botswana, St. Vincent & Grenadines, Namibia, Timor-Leste, Grenada, Suriname, St. Kitts & Nevis, Belize, Afghanistan, Senegal, Somalia, South Sudan, Dominica, Mozambique, Myanmar (Burma), Haiti, Djibouti, Barbados, St. Helena, Cote D'Ivoire, Jamaica, Guyana, Maldives, Cayman Islands, Congo – Brazzaville, Curaçao, Benin, Luxembourg, Gabon, French Guiana, Mongolia, St. Lucia, Togo, Macao, Tajikistan, Brunei, Burkina Faso, Mali, Angola, Sudan, Bahrain, Niger, Madagascar, Laos, Jersey, Tunisia, Albania, Trinidad & Tobago, Armenia, Bahamas, Palestine, Qatar, Oman, Turkmenistan, Congo – Kinshasa, Honduras, Uzbekistan, Kuwait, Belgium, Bosnia & Herzegovina, Ireland, Cyprus, Moldova, Georgia, Yemen, Iraq, Kyrgyzstan, Peru, Malta, Morocco, Nicaragua, El Salvador, Algeria, Paraguay, Azerbaijan, New Zealand, Libya, Uruguay, Guatemala, Ecuador, Taiwan Estonia, China, Denmark, Panama, Colombia, North Macedonia, Costa Rica, Portugal, Greece, Croatia, Austria, Sweden, Bulgaria, Syria, Dominican Republic, Belarus, Israel, Hungary, Kazakhstan, Lithuania, Finland, Argentina, Romania, Turkey, Italy, Czechia, Chile, Ukraine, Poland, Venezuela, Slovakia, Serbia, Aruba, Anguilla, Andorra, Antarctica, French Southern Territories, Antigua & Barbuda, Caribbean Netherlands, St. Barts, Bermuda, Bouvet Island, Central African Republic, Cocos (Keeling) Islands, Cook Islands, Comoros, Cape Verde, Cuba, Christmas Island, Western Sahara, Falkland Islands (Islas Malvinas), Faroe Islands, Guernsey, Gibraltar, Guinea, Guadeloupe, Equatorial Guinea, Guam, Heard & McDonald Islands, Isle of Man, British Indian Ocean Territory, Iceland, Kiribati, Liechtenstein, Latvia, St. Martin, Monaco, Montenegro, Northern Mariana Islands, Mauritania, Montserrat, Martinique, New Caledonia, Norfolk Island, Niue, Nauru, Pitcairn Islands, Puerto Rico, North Korea, French Polynesia, South Georgia & South Sandwich Islands, Svalbard & Jan Mayen, San Marino, St. Pierre & Miquelon, Sao Tome and Principe, Slovenia, Sint Maarten, Turks & Caicos Islands, Chad, Tokelau, Tuvalu, U.S. Outlying Islands, Vatican City, British Virgin Islands, U.S. Virgin Islands, Wallis & Futuna, Kosovo

Table A1.
List of countries

Source(s): Google Trends

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