

DOES IT MATTER FOR CBDC DESIGN? PRIVACY-ANONYMITY PREFERENCES FROM THE SIDE OF HIERARCHIES AND EGALITARIAN CULTURAL PATTERNS

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ABSTRACT

Evolution of digital money demonstrates that CBDC (Central Bank Digital Currency means a digital form of traditional fiat currencies) design is really challenging. While technically possible CBDC solutions are visible, much of institutional aspects are rest to be unsolved. One of the issues is a degree of privacy and anonymity. All historical forms of money had intrinsic property of non-traceability of transactions and only now this feature of non-digital money is recognized as strong institutional advance. At the same time, privacy and anonymity preferences could relate to cultural attitudes. However, money may distort expected logical relations between such patterns like “less hierarchies more privacy-anonymity” or “more egalitarianism less privacy-anonymity”. This potentially means that money may posit extra propensity to privacy-anonymity that is going beyond the cultural attitudes. Basing on the survey, we demonstrate some contradictions in how respondents perceive the preference of functional usability over anonymity of transactions. The same is relevant when cultural patterns are taken into account. It is more likely to find cultural closeness across respondents from different regions than strong determinacy of privacy-anonymity preferences by propensity to hierarchies or egalitarianism. Additionally, we checked hierarchies or egalitarianism attitudes by additional questions and found some mixed results. Also, we found some conformism culture (meaning unstable preferences) and rely it with lack of trust in public institutions. When centralized money are less trusted people faster agree to sacrifice anonymity in the benefits of functionality. The main take away is that it is unlikely to expect the unity of optimal CBDC design across countries. Aside of behavioural distortions, culture still matter and it is likely to expect future variety of digital money from functional usability privacy-anonymity trade-off.

Keywords: CBDC design, digital money, cultural attitudes, privacy, anonymity.

1. INTRODUCTION

The short history of cryptocurrencies has shown that they can significantly affect the evolutionary trajectory of money. Even embodying the questionable ability to provide mass transactions, they have already influenced changes in behaviour regarding the development of payment technologies. Today, we can say that the expansion of crypto assets is increasingly shifting to the financial side. But it is the combination of payment capabilities, asset behaviour and technological ways to go beyond regulation that makes them so attractive. Naturally, this could potentially undermine the inviolability of the current monetary order, based on fiat money, the stability of which is ensured institutionally through the appropriate mandate of central banks in the field of price and financial stability. It is no coincidence that monetary authorities are responding by actively developing

projects on their own digital money - CBDC (for a more detailed overview of how far central banks have moved forward in the issue, see [Auer et al \(2020\)](#)).

However, the design of the CBDC remains a serious issue for discussion at the moment ([Mancini-Griffoli et al \(2018\)](#)). This is due to the fact that potentially the technologies underlying digital money of central banks allow the implementation of functionality that goes beyond established monetary practices (for example, the interest rate corridor for all economic agents), or which raises the question of a new dimension of social norms about money in the digital age. A clear expression of the CBDC design problem is the issue of privacy and anonymity of money transactions. The success of CBDC projects on a large scale will largely depend on the attitude of economic agents to this aspect of money.

At the same time, issues of privacy and anonymity are not economic variables. They are heavily influenced by cultural attitudes. This means that attitudes to the extent to which money should embody privacy may differ from one society to another. Moreover, it can be assumed that even within one country, one may not see sufficient homogeneity in the advantage of anonymity over functional convenience when it comes to digital money. Empirical assessments of cultural attitudes may not work well enough in the digital world. For example, [Koziuk \(2021\)](#) shows that trust in digital money is more driven by age than by some structural factor. It follows that obtaining direct information about the importance of privacy and anonymity in the digital world may be a more advantageous option when studying the issues of optimal CBDC design. Based on the survey, this article reveals a number of controversial points on how cultural attitudes such as individualism and egalitarianism can relate to the problem of privacy and anonymity of digital money. Privacy and anonymity have been found important (as, for example, [Borgonovo et al show \(2021\)](#)), but they are not rigidly driven by individualism or predisposition to egalitarianism. Surveys have shown that the predisposition to individualism or egalitarianism can be distorted by monetary incentives. This means that functional convenience vs. privacy and anonymity of trade-off does not have an unambiguous solution. Most likely, there will be no unified optimal CBDC design by countries.

2. LITERATURE REVIEW

The problem of digital money has convincingly demonstrated that the implementation of three basic functions (medium of exchange, unit of account, store of value) in their structural integrity is no longer a given fact that is perceived as appropriate. Most modern theories of money are more focused on the multiplicity of money, money as memory, money as a manifestation of trust in decentralized interactions ([Zucker \(1984\)](#), [Zalizer \(1994\)](#), [Zanini and Migueles \(2013\)](#), [Borio \(2019\)](#), [Kocherlakota \(1996, 1998\)](#), [Schnabel and Shin \(2004, 2018\)](#), [Vaz and Brown \(2020\)](#)). At the same time, studies that reveal the essential conditionality of economic processes by cultural patterns also point to the importance of institutional and behavioural approaches in money analysis ([Araujo \(2004\)](#), [Borgonovo et al \(2021\)](#), [Masciandaro \(2018\)](#)). In addition, the emergence of the economy of privacy has shown that the behaviour of individuals in the digital world is subject to much more distortion than previously thought. The so-called privacy paradox is a clear confirmation of this ([Athey et al \(2017\)](#)). Therefore, the study of privacy and anonymity preferences in the context of CBDC in terms of societal or individual values requires a broader view of the problem, as traditional CBDC design analysis is more concerned with use-case, technological platforms as well as the impact on price and financial stability ([Agur et al \(2019\)](#)). Similarly, [theoretical analysis of block-chain \(Halaburda et al \(2020\)\)](#) and privacy ([Acquisti et al \(2016\)](#)) are largely based on the orthodox approach of economics.

It is recognized in the literature that the demand for CBDC on the part of economic agents will be largely determined by structural factors. A number of works note the importance of the level of development of the shadow economy, financial intermediation, the high cost of payment services, and the scale of cross-border transfers. It is recognized that the structural factors of supply and

demand of the CBDC will determine the extent to which digital money of centralized issuance will be required for retail payments and financial inclusion (Auer et al (2021), Alfonso et al (2022), Croxson et al (2022)).

On the other hand, the very issue of CBDC design has prompted central banks to find out which features of the digital currency are most important to economic agents. Surveys conducted by the European Central Bank have shown that the privacy of transactions is a key requirement for the digital equivalent of cash (ECB (2021)). The issue of finding an institutional and technological format is also actively debated in the literature (ECB (2019), Grothoff and Moser (2021), WEF (2021)). The issue of the technological response to how to reconcile the digital nature of money with privacy cannot but rest on additional institutional requirements. In fact, it is institutional factors that will determine the nature of the protocol that will ensure privacy in the digital environment.

Although the privacy of digital money has begun to be actively debated in the context of central banks' response to the expansion of cryptocurrencies, the theory of money has formed a clear direction, which directly indicates that privacy is one of the properties of money. Khan et al (2004) point out that most traditional money researches emphasize that it is a tool for record-keeping and information imperfections of a system based on credit money. The approach of money as memory (Kocherlakota (1996, 1998)) develops another aspect of such a traditional approach with an emphasis on the problem of trust in decentralized interactions, which should be based on the confirmation of the value of exchange. According to Khan et al (2004), such views do not take into account that privacy is already a factor that gives value to money.

A number of behavioural experiments confirm the position that privacy and anonymity are what gives money value (Borgonovo et al (2021), Masciandaro (2018)). Masciandaro (2018) reformulates the traditional three functions of money (medium of exchange, unit of account, store of value) by defining three properties of money: a means of ensuring the advantage of liquidity, a means of preserving value as an opportunity to prevent opportunity costs, a means of accumulation and transmission of information. From the last property of money, the preference for privacy and anonymity follows. It is based on this view of the properties of money that the behavioural experiment is constructed according to Borgonovo et al (2021). The conclusion that follows from it: economic agents attach importance to anonymity; the preference for anonymity is due to the propensity of economic agents to risks; the opportunity to give up liquidity benefits should be accompanied by a greater reward in the form of income (Borgonovo et al (2021)). It is also concluded that the combination of advantages in terms of liquidity, anonymity and prevention of opportunity costs is extremely sensitive to individual preferences (Borgonovo et al (2021), Masciandaro (2018)). The results of this behavioural experiment confirm the validity of the approach according to which the preference for privacy and anonymity as the value of money can be based on cultural attitudes. For example, the propensity to risk is often a culturally determined factor or a reflection of the specifics of the perception of social trust in society. On the other hand, and this is in line with the view presented in this article, intercultural empirical criteria may not always give a reliable result, as behavioural distortions can be triggered in conditions of a complex choice dilemma. Therefore, it is better to rely on direct evidence of preferences and test them indirectly through the logical connection with cultural attitudes and the stability of such attitudes in response to monetary incentives.

Regarding the factor of culture in the economy, we can note the growing volume of literature, which recognizes its important role in identifying stereotypes of social behaviour, group interactions and individual preferences, which cannot be ignored in their pure form. A review of the literature on this issue and a discussion of the results of a study of the impact of culture on the economy are well presented in Guiso et al (2006). There is no lack of evidence that cultural factors directly affect people's monetary habits, even within one country (Jost (2018), Henchoz et al (2019)). Cultural factors also influence the design of monetary policy institutions (Tognato (2012)). For example, a tendency towards individualism, a lower tendency towards hierarchies and uncertainty leads to

a more likely choice in favour of a more independent central bank and lower inflation (de Jong (2002)).

Cultural differences are considered to be important factors in the attitude to money, choice of consumption and savings, loan propensity (Henchoz et al (2019)). At the same time, it is important that preferences for economic choice are influenced by individualism, propensity for hierarchies, attitudes towards risk and uncertainty, which are signs of cultural affiliation (Falicov (2001)). Based on a number of studies in the field of behavioural sciences, it seems logical to assume that privacy and anonymity are not abstract economic preferences, but culturally driven drivers of behaviour. Many studies note that a higher propensity for privacy and anonymity is characteristic of societies with a more pronounced propensity for individualism (Li et al (2017)). Similarly, a higher degree of insensitivity to uncertainty corresponds to the predominance of privacy (Trepte et al (2017)). However, there is a paradox here, as traditionally a higher propensity for individualism positively corresponds to a propensity for risk and acceptance of uncertainty. The same applies to the problem of egalitarianism. Egalitarian societies may encourage less privacy. But here the problem of hierarchy arises, because hierarchies can encourage privacy as a protective reaction, or rely on less pronounced privacy on the grounds that hierarchies are supported by collectivism. Omrani and Soulie (2017) demonstrate a more sophisticated approach. They point out that more hierarchical societies and societies with strong competition encourage individuals to be more concerned with privacy. Individuals from societies where equality and cooperation prevail are less concerned about privacy.

However, there are a number of problems. Firstly, as already mentioned, the success of CBDC project promotion depends largely on how much the digital currency of central banks will be in demand and the degree of demand will be influenced by its design. At the same time, as Koziuk (2021) shows, political regime can be important, because for autocracies the CBDC can be a form of sophisticated control over individuals. At the same time, the autocracies themselves are inconceivable without hierarchy and the cultivation of collectivist values. Secondly, in the digital world, privacy undergoes a paradox of privacy, so that individual preferences, rather than cultural patterns, can more clearly demonstrate the importance of anonymity as a property of money. Thirdly, privacy is a cultural phenomenon and corresponds to a wide range of different characteristics of society, which can often contradict each other on a theoretical level, but reflect the specific features of a society.

Based on this, it is possible to build a search question on the extent to which economic agents are willing to give up the convenience of digital money in favour of guaranteeing privacy and anonymity of money transactions, in the context of their commitment to hierarchies and egalitarianism. However, the basic hypothesis is that privacy in the aspect of money may have more properties than those derived from cultural characteristics, and such characteristics themselves may be distorted under the influence of monetary incentives. The direct survey approach avoids the debate over what dominates the formation of preferences for dealing with the attributes of the digital world – individual preferences or cultural patterns. At the same time, the ability to identify respondents by the principle of a region of origin preserves the possibility of direct appeal to their cultural characteristics. Also, the logic of the study is based on the rational assumption that individualism and hierarchies move in opposite direction. A lower propensity to hierarchies should correspond to a higher level of privacy. Respondents with a lower propensity to hierarchies should prefer anonymity when conducting money transactions. The opposite is expected in the case of egalitarianism. At the same time, additional control questions were used to assess the extent to which the identified advantage of individualism, hierarchy and egalitarianism is stable under the influence of monetary incentives.

The results of the survey analysis confirmed that the privacy and anonymity factors are important. However, (i) anonymity of money preferences not only determined by culture, (ii) factors like lack of trust in public institutions also affect why functionality vs anonymity trade-off may be different in different societies, (iii) the stated assessments of personal propensity to hierarchy and

egalitarianism are not stable under the influence of monetary incentives. This proves that privacy and anonymity in the digital environment are determined by individual preferences, which are influenced by cultural and institutional factors, although not severely. Also, we identified so called culture of conformism that demonstrate unstable preferences and rely it with lack of trust in public authority. Due to this finding it is possible to see that when centralized money are less trusted economic agents more agree to sacrifice anonymity in benefit of more functionality. The general take away from this is that a unified approach to optimal CBDC design across countries is hard to expect.

3. METHODOLOGY

Detection of cultural attitudes is not always possible to establish in behavioural experiments. Although the focus of the research is on identifying attitudes to privacy and anonymity as a property of money in the context of CBDC design, surveying respondents representing potentially different cultures reveals additional aspects of the problem. For example, a survey or experiment within one cultural group allows you to see preferences and perceive them as given. The presence of a broader cultural context suggests that either attitude toward privacy and anonymity of money is similar across cultures, or it is different. Similarly, the survey takes into account the factor of preferences concerning individualism and egalitarianism as cultural attitudes that may affect preferences regarding the properties of money. Similarly, cultural differences can affect the algorithm of connections: cultural affiliation – individualism/egalitarianism – privacy/anonymity. That is, if we follow the same pattern of self-identifications and cross-cultural preferences confirmed in the responses, we can assume that cultural attitudes have a universal impact on how economic agents are willing to see the money. If such patterns differ, it is worth noting that cultural factors are important for money design. On the other hand, the structure of the survey allows additional verification of the stated values concerning hierarchies/egalitarianism by analysing the responses-reactions to additional monetary incentives. The latter is important to determine the extent to which cultural determinants of value are sustainable under the influence of monetary incentives.

In terms of methodology, the study is based on the data of the analysis of the correspondence form of the survey, conducted by mail to the addresses of selected persons who have previously agreed to participate. A successful and positive feature of this survey is that the general educational and cultural level of the respondents was taken into account when forming the content of the questionnaire. Empirical data of the study are based on a survey of 164 respondents who come from three continents, including Africa (40 people), Asia (45 people) and Eastern Europe (79 people). The structure of the questionnaire, in general, is typical. It contains a short preface in the form of an appeal to the respondent, which indicates the topic, purpose of the survey, the organization and the person responsible for conducting the survey as well as information about confidentiality. There is also a link to the questionnaire using the “Google forms” service and an explanation of how to fill it out.

One of the most important stages of the research is the selection of people interviewed during the research. In order to be more representative and get professional answers to the questions included in the questionnaire, only those who had previously passed a test selection on the basics of understanding the money market were included in the survey. Regarding the distribution of respondents by age, the largest share of people from Africa and Asia are between 18 and 25 years old, in percentage terms it is 85% and 89%, in Eastern Europe the largest share are between 26 and 35 years old, corresponding to 70% (Table 1).

Table 1. Distribution of respondents by age*

	Number of answers, in %		
	from 18 to 25	from 26 to 35	more than 45
Africa	85%	15%	0%
Asia	89%	11%	0%
Eastern Europe	19%	70%	11%

*Source: formed on the basis of survey results.

Concerning the assessment of personal well-being, the results were similar for Eastern Europe and Asia. 41% of respondents from Eastern Europe said they had a low income, and about the same proportion of respondents was from Asia (42%); things were slightly better in Africa, where 33% said they had a low income. According to the data obtained, only people from Asian countries indicated that their income level was higher than average, their percentage was 16% (Table 2).

Table 2. Respondents' assessment of their income level*

	Number of answers, in %		
	Low	Average	Above average
Africa	33%	68%	0%
Asia	42%	42%	16%
Eastern Europe	41%	59%	0%

*Source: formed on the basis of survey results.

It is possible that this result is due to some shift in the sample, because of the fact that respondents from Africa may represent relatively wealthier strata than respondents from the other two regions. However, this is quite a relative factor that cannot affect the overall result, given the lack of a significant gap in GDP indicators per capita by respondents' countries of origin.

4. RESULTS

The importance of financial inclusion is noted in most studies that focus on the analysis of potential demand for the retail option of CBDC (Auer et al (2021), Alfonso et al (2022), Croxson et al (2022)). Similarly, the rapid development of fintech affects the expanding options of payment services and further differentiation of values for the client that they carry. Initial differences in the availability of payment services determine how respondents assess the importance of payment technologies for them. The most significant is the development of payment technologies for people of African descent – their share is 98%. Data on Asia and Eastern Europe show that respondents are less interested in this issue, accounting for 82% and 84%, respectively (Table 3).

Table 3. Are changes in payment technologies important to you?*

	%	
	Yes	No
Africa	98%	3%
Asia	82%	18%
Eastern Europe	84%	16%

*Source: formed on the basis of survey results.

Although central banks and the BIS focus on the factor of financial inclusion that may underlie CBDC design approaches, there is a clear problem with economic agents' awareness of what digital money of centralized emission is. Importantly, ignorance concerning the CBDC may seem strange in light of the importance of payment technologies recognition. This is paradoxical, given the large-scale structural changes that may be activated by the CBDC implementation process. The widespread establishment of the central bank's digital currency can lead not only to global changes in payment, clearing and settlement mechanisms, but also significantly affect the composition of the monetary base and money structure, change the functions of commercial banks and the competence of central banks in the monetary and payment system, influence the implementation of monetary and macroprudential policy. The largest number of respondents aware of the CBDC is in Eastern Europe – 48%, in Africa and Asia – 20% and 22%, respectively (Table 4). This is in stark contrast to the data in Table 3, especially in the case of respondents from Africa.

Table 4. Do you know about the digital currency of central banks (CBDC)?*

	%	
	Yes	No
Africa	20%	80%
Asia	22%	78%
Eastern Europe	48%	52%

*Source: formed on the basis of survey results.

Guarantees of privacy and anonymity of transactions are important ethical issues of CBDC implementation. Traditional fiat money will embody this property mechanically. In the case of digital money, a certain protocol is needed, which is set at the border of technology and institutional solution. If the simplification of the customer identification procedure makes it easier to access payment services, it does not guarantee that economic agents will be willing to sacrifice part of the anonymity of transactions. If digital currency settlements are more frugal, economic agents should be more willing to use them. But the question remains: will the citizens themselves agree that their operations will be completely open and lose their anonymity as well as confidentiality? As the level of CBDC privacy also depends on the design of digital money, the question arises concerning how aware respondents are of this. Natives of Asia are the most aware of this – 67%, slightly lower rate natives of Africa have – 45% and the lowest rate have respondents from Eastern Europe – 33% (Table 5). The results of Table 5 also show some inconsistency with the data of Table 4. It seems that awareness of the CBDC does not mean that respondents fully understand that digital money can be programmed, and that the design of their functionality corresponds to a particular idea that is the subject of policy choice.

Table 5. Do you know that the level of privacy of transactions depends on the design of digital money?*

	%	
	Yes	No
Africa	45%	55%
Asia	67%	33%
Eastern Europe	33%	67%

*Source: formed on the basis of survey results.

Finding a balance between anonymity and traceability has proved to be a key aspect of new discussions about money. If experiments show the importance of privacy and anonymity (Borgonovo et al (2021), Masciandaro (2018)), the results of the survey rather confirm this. However, there is a significant variation of affirmative answers according to the regional criterion. The most important right to realize the privacy of transactions is for the representatives of Africa – 98%, while for the representatives of Asia and Eastern Europe this figure is lower – 71% and 48%, respectively (Table 6). This distribution of votes is quite easy to explain in the context of Africa, which may be the result of a long experience of distrust of external authorities or state institutions. Fewer affirmative responses from Asia could be explained by the well-known propensity of the residents of the continent to collectivist values. But the data on Eastern Europe is somewhat confusing. This result can be explained by the fact that respondents from this region are a priori convinced that their transactions have a high probability of tracking, and therefore they try to ensure privacy in some other way, as confirmed by the answers to additional questions (Table 6).

Table 6. Is the implementation of the right to privacy of transactions important to you?*

	%		
	Yes	No, but I use other methods to exercise this right	No, I'm concerned about the privacy of my payments
Africa	98%	3%	0%
Asia	71%	11%	18%
Eastern Europe	48%	13%	39%

*Source: formed on the basis of survey results.

Because transaction traceability depends on the design of the CBDC, the relationship between consent to privacy restrictions and privacy preferences is equally important. Thus, the representatives of Asia find the greatest response to the privacy of transactions for the sake of public interests – 71%, the results of representatives of Africa and Eastern Europe – 63 and 68%, respectively (Table 7). Such results are somewhat consistent with preliminary data. For example, it is respondents from Asia who are most familiar with the fact that transaction tracking follows from digital money design. The same respondents have a lower interest in privacy than others. In other words, such results reflect that the cultural factor plays a certain role. Most likely, it should be not so much about social trust in state institutions for reasons of quality of institutions, but about cultural drivers of external authority acceptance and a tendency to collectivism.

Table 7. Do you allow restrictions on the privacy of transactions for the sake of public interests?*

	%	
	Yes	No
Africa	63%	38%
Asia	71%	29%
Eastern Europe	59%	41%

*Source: formed on the basis of survey results.

Respondents from Africa, Asia and Eastern Europe are almost unanimous about the possible impact of transaction tracking on the decline in the popularity of digital money – 58%, 53% and 53%, respectively (Table 8). But even here, respondents from Asia differ from, for example,

representatives of the African continent in terms of willingness to sacrifice privacy for convenience, confirming previous findings.

Table 8. Do you think that transaction tracking reduces the popularity of digital money?*

	%	
	Yes	No
Africa	58%	43%
Asia	53%	47%
Eastern Europe	53%	47%

*Source: formed on the basis of survey results.

But the data in table 9 show that the issue of money privacy is subject to certain behavioural distortions. The statement that cash provides the highest level of anonymity of transactions is most shared by representatives of Asia – 60%, respondents from Africa – 55%, and the least – from Eastern Europe – 41%, which may indicate a low level of confidence in all forms of transactions (Table 9). Thus, the representatives of Asia, to the greatest extent pointing to the willingness to compromise privacy, say that it is cash that most embodies privacy. The lowest degree of cash privacy is in the perception of Eastern European respondents. Firstly, it follows that perceptions of the privacy of digital money and cash may differ. Secondly, it is difficult to explain in terms of the theoretical connection between cultural attitudes and economics. Thirdly, the institutional fact of greater trust in state institutions is likely to work. Lack of trust in monetary or banking regulators may extend to a distorted perception of the anonymity of traditional monetary transactions.

Table 9. Do you think that paper money provides the highest degree of anonymity of transactions?*

	%	
	Yes	No
Africa	55%	45%
Asia	60%	40%
Eastern Europe	41%	59%

*Source: formed on the basis of survey results.

As for anonymity vs functionality trade-off, the results are generally twofold. Among the respondents, it is the representatives of Eastern Europe who are most willing to sacrifice some aspect of the anonymity of transactions for the convenience of their conduct – 53%, representatives of Asia and Africa – 44% and 33% (Table 10). On the one hand, it is the African people who are most consistent in their preference for privacy/anonymity, as evidenced by previous responses. Respondents from Asia take an intermediate position in this regard, with certain elements of inconsistency. They are the most willing to limit privacy restrictions, but not the most willing to sacrifice it for convenience. On the other hand, the response of respondents from Central and Eastern Europe may seem contradictory. However, there is a hidden sequence in it: if there is no trust privacy provision, then its loss is not a problem. This once again indicates that not only cultural patterns but also aspects of institutional trust are important for economic agents' preference for digital money.

Table 10. Are you willing to sacrifice some aspect of the anonymity of transactions for the convenience of their conduct?*

	%	
	Yes	No
Africa	33%	68%
Asia	44%	56%
Eastern Europe	53%	47%

*Source: formed on the basis of survey results.

Regarding the awareness of the importance of digital money convenience, the results of the survey (Table 11) reflect the situation with the preference for convenience over anonymity (Table 12). The majority of respondents from all continents agree with the statement that the convenience of payment services is the main advantage of digital payment technologies: from Africa – 90%, Asia – 84%, and Eastern Europe – 89%. However, this gives rise to excellent CBDC design options. For some central banks, a combination of functional advantages with anonymity will be more socially optimal, while others may compromise without significant concerns about the demand for centralized digital money.

Table 11. Do you think that the convenience of payment services is the main advantage of digital payment technologies?*

	%	
	Yes	No
Africa	90%	10%
Asia	84%	16%
Eastern Europe	89%	11%

*Source: formed on the basis of survey results.

The next group of questions is to find out the role of the values of individualism and egalitarianism, and how they are affected by additional monetary incentives. Since the tendency to privacy in the literature is considered to be based on individualism and lower egalitarianism, the additional cross-check is designed to reveal either the stability of preferences or obvious behavioural distortions. The view that the location of individuals and groups from top to bottom in horizontal layers on the basis of inequality in income, property, education, power, professional prestige, as a result, should be reflected at a certain distance is least shared by Africans – 25%, followed by representatives of Eastern Europe – 44%, while a much greater tendency to hierarchies respondents from the Asian continent show – 56% (Table 12). These results indicate a clear problem with the standard interpretation of the conditionality of privacy by cultural factors. For example, respondents from Africa have the greatest rejection of hierarchies (Table 12), but they also showed the strongest preference for privacy and anonymity as a property of money (Tables 5-8, 10). As expected, Asian respondents showed the greatest willingness to tolerate hierarchies, but their anonymity in money transactions was less pronounced. The preferences of respondents from Eastern Europe seem to be the least stable. They allow some tolerance for hierarchies, but do not consider the privacy of digital money the most valuable. In the first approximation, we can assume the greatest stability and consistency of preferences among respondents from Africa and the least – among Eastern Europeans.

Table 12. Do you share the opinion that in society there should be a distance among people (social classes)?*

	%	
	Yes	No
Africa	25%	75%
Asia	56%	44%
Eastern Europe	44%	56%

*Source: formed on the basis of survey results.

The results on tolerating social inequality (Table 13) are consistent with the attitude towards hierarchies (Table 12). Among respondents, the opinion that social inequality is a normal phenomenon is most shared by respondents from Asia – 62%, the share of respondents from Africa and Eastern Europe who agree with it is 50% and 52% respectively (Table 13). A similar structure of responses is observed in two of three groups to the question “Are you willing to spend part of your income to reduce inequality in society?”: respondents from Asia – 62%, Africa – 58%, with the lowest sacrifice in representatives of Eastern Europe – 35% (Table 14).

Table 13. Do you recognize that social inequality is normal?*

	%	
	Yes	No
Africa	50%	50%
Asia	62%	38%
Eastern Europe	52%	48%

*Source: formed on the basis of survey results.

Table 14. Are you willing to spend part of your income to reduce inequality in society?*

	%	
	Yes	No
Africa	58%	43%
Asia	62%	38%
Eastern Europe	35%	65%

*Source: formed on the basis of survey results.

The data in Tables 12-14 confirm once again that for some regions there is a relatively clear sequence of links between cultural attitudes and privacy, while for others it is less pronounced. This can be explained by the fact that there is a certain culture of social conformism. Most likely, the lack of trust in government institutions requires adaptability, which gives rise to such conformism. Historical experience plays an important role in breaking the traditional links between culture and the preference for privacy under the influence of institutional factors.

Attitude toward hierarchies is another dimension of identifying the influence of culture on privacy/anonymity preferences. Among the respondents, the largest share of those, who prefer hierarchical organizations in Eastern Europe is 73%, while in Asia and Africa – 64% and 55% respectively (Table 15), but this contradicts the obtained answers to the question “Do you share the opinion that in society there should be a distance among people (social classes)?” to which 56% of respondents

from the Eastern Europe responded negatively (Table 12).

Table 15. Do you prefer to work in hierarchical organizations?*

	%	
	Yes	No
Africa	55%	45%
Asia	64%	36%
Eastern Europe	73%	27%

*Source: formed on the basis of survey results.

Also, there is a certain contradiction between the data in Table 12 and Table 16, which reflects the answer to the question “Do you prefer relationships that involve equality of participants?” to which 87% of representatives of Eastern Europe answered affirmatively, among representatives of Africa and Asia this figure is 78% and 83%, respectively (Table 16).

Table 16. Do you prefer relationships that involve equality of participants?*

	%	
	Yes	No
Africa	83%	18%
Asia	78%	22%
Eastern Europe	87%	13%

*Source: formed on the basis of survey results.

Table 16 shows that people prefer equality of relations, but when we compare this information with Table 17, we see that this dependence in relation to the relationship does not dominate, that is, there is a certain contradiction. This suggests that the income factor in principle can potentially affect the change in our preferences.

Table 17. Are you ready to agree to work in more hierarchical organizations to increase your income?*

	%	
	Yes	No
Africa	75%	25%
Asia	82%	18%
Eastern Europe	87%	13%

*Source: formed on the basis of survey results.

The data in Table 18 confirm that the idea of sustainability and consistency of preferences is a kind of cultural trait. Monetary incentives affect potential changes in preferences. The lowest number of people willing to agree to the loss of part of the income for the sake of comfort in organizations with equality of participants in Eastern Europe is 33%, while in Asia this figure is 62%. This reaffirms the existence of more pronounced collectivist values in Asia and values of conformism in Eastern Europe.

Table 18. Are you ready to accept the loss of part of the income for the comfort of working in organizations with equality of participants?*

	%	
	Yes	No
Africa	53%	48%
Asia	62%	38%
Eastern Europe	30%	70%

*Source: formed on the basis of survey results.

We suggest that the experience of cryptocurrency transactions may influence the formation of preferences concerning digital money and CBDC in particular. Among the respondents, Asian representatives invested the most in cryptocurrency – 36% (Table 19). Theoretically, the level of well-being affects the risk appetite. Therefore, there is a certain discrepancy here, as respondents from Asia did not recognize their income as high (Table 2).

Table 19. Have you invested in cryptocurrencies?*

	%	
	Yes	No
Africa	28%	73%
Asia	36%	64%
Eastern Europe	22%	78%

*Source: formed on the basis of survey results.

The same problem exists regarding the discrepancy between the experience of cryptocurrency transactions and awareness of CBDC with other aspects of the digital world (Tables 3-4). In essence, this means that the experience of transactions does not affect preferences for privacy/anonymity of digital money. This is an important argument in favour of the fact that institutional and cultural factors are important. On the other hand, cryptocurrencies are decentralized money, and representatives of societies most prone to hierarchies and inequalities have experience in dealing with them (Table 17). This indicates either that hierarchies do not exclude the possibility of receiving benefits given by more decentralized systems, or that money “slips out” of traditional hierarchies, but then the willingness to sacrifice the privacy of money transactions is a certain cognitive distortion. However, if economic agents view cryptocurrencies as narrowly specialized (or clearly segmented) and do not associate them with money in the general sense, it is possible to explain why hierarchy and experience differently shape the demand for privacy when it comes to public money. However, in Eastern Europe, there is a paradoxical situation when the percentage of affirmative answers to two questions differs significantly – 30% and 87%, respectively (Tables 17-18). This once again confirms the existence of a “culture of conformism”.

5. ROBUSTNESS CHECK

To further empirically confirm the robustness of the survey results, a test was conducted on the conditionality of respondents' responses to the region of their origin. This test involves determining the value of Chi^2 for each questionnaire question. The general assumption is that in the case of a significant value of Chi^2 , the answer is regional, ie, there is a fact of statistical confirmation of the role of cultural factors. In the case of a low value of this indicator, on the contrary, regional factors

are not decisive. So, there is such a scattering of answers that can be considered relatively universal without the dominance of cultural patterns expressed by regional affiliation.

In technical terms, the following hypotheses are being tested:

Zero hypothesis: *survey results do not depend on the region.*

Hypothesis 1: *survey results depend on the region of the survey.*

Empirical data are presented in table 20.

Table 20.

Question number	CHI-SQUARE	Critical Value of Chi-square	Chi-Test (P) Value	Hypothesis that is being accepted
1 Distribution of respondents by age	85,70	9,487729	54%	Hypothesis 1
2 Respondents' assessment of their income level	57,54	9,487729	59%	Hypothesis 1
3 Are changes in payment technologies important to you?	49,80	5,991465	64%	Hypothesis 1
4 Do you know about the digital currency of central banks (CBDC)?	18,20	5,991465	96%	Hypothesis 1
5 Do you know that the level of privacy of transactions depends on the design of digital money?	19,49	5,991465	63%	Hypothesis 1
6 Is the implementation of the right to privacy of transactions important to you?	65,61	9,487729	66%	Hypothesis 1
7 Do you allow restrictions on the privacy of transactions for the sake of public interests?	7,89	5,991465	88%	Hypothesis 1
8 Do you think that transaction tracking reduces the popularity of digital money?	1,01	5,991465	98%	Hypothesis 0
9 Do you think that paper money provides the highest degree of anonymity of transactions?	5,43	5,991465	85%	Hypothesis 0
10 Are you willing to sacrifice some aspect of the anonymity of transactions for the convenience of their conduct?	3,83	5,991465	95%	Hypothesis 0
11 Do you think that the convenience of payment services is the main advantage of digital payment technologies?	53,19	5,991465	59%	Hypothesis 1
12 Do you share the opinion that in society there should be a distance among people (social classes)?	11,34	5,991465	83%	Hypothesis 1
13 Do you recognize that social inequality is normal?	2,08	5,991465	96%	Hypothesis 0
14 Are you willing to spend part of your income to reduce inequality in society?	12,01	5,991465	73%	Hypothesis 1
15 Do you prefer to work in hierarchical organizations?	21,92	5,991465	65%	Hypothesis 1
16 Do you prefer relationships that involve equality of participants?	48,76	5,991465	58%	Hypothesis 1
17 Are you ready to agree to work in more hierarchical organizations to increase your income?	49,02	5,991465	57%	Hypothesis 1
18 Are you ready to accept the loss of part of the income for the comfort of working in organizations with equality of participants?	21,48	5,991465	59%	Hypothesis 1
19 Have you invested in cryptocurrencies?	81,14	5,991465	37%	Hypothesis 1

*Source: formed on the basis of survey results.

The obtained results in general allow confirming the preliminary results. However, in some cases, the clear conditionality of the answers by the regional affiliation of the respondents was not confirmed. This includes questions concerning the impact of transaction tracking on the popularity of digital money (question 8), guarantees of anonymity from the side of paper money (question 9), willingness to sacrifice part of anonymity for the convenience of payments (question 10) and the normality of social inequality (13). This situation can be explained by the role of non-cultural institutional factors, which confirms the assumptions about the role of trust in public institutions alongside the cultural factors of the advantage of anonymity. This is particularly clear in the case of questions 8 and 9 as well as question 10 thereof. In other words, a lack of trust in digital money for transaction tracking, paper money anonymity, and the resulting willingness to sacrifice anonymity for convenience if the former is not trusted is evidence of a more general manifestation of monetary order failures. The collective experience of distrust in the central bank institution or its ability to conduct effective socially optimal regulation (which is a broader issue of trust in political institutions) may not be culturally conditioned. In the case of social inequality, the situation may be somewhat different. Its adoption may have different meanings in different cultures, as a result of which the test does not show the regional conditionality of the answers to the question about recognizing the normal phenomenon of social inequality. More importantly, other cultural factors influencing the choice of privacy preferences, such as the propensity for hierarchies or the willingness to sacrifice income for the sake of higher equality, remain significant, based on the value of Chi^2 , as shown in Table 20. Thus, the conducted empirical test confirms that when cultural factors do not fully explain the choice in favour of privacy/anonymity, this is due to the greater importance of factors of trust in institutions. This is equally important for CBDC design. Along with the introduction of digital currencies by central banks, success should be based on both the compliance with the profile of social preferences for privacy/anonymity and the ability to guarantee better prospects for the monetary stability of centralized digital money.

6. CONCLUSIONS

To what extent the perspective of CBDC will be determined by the chosen design is an important practical question. Discussions concerning the design of digital currencies of central banks have shown that the most far-reaching issues are privacy/anonymity and the extent to which, on the one hand, this is in line with public preferences and, on the other hand, – with the institutional environment in which the central bank operates. As privacy/anonymity have cultural determinants, it is likely that they will determine what the optimal CBDC design will be. However, the very fact of the importance of privacy/anonymity is a challenge when it comes to digital money, because it is based on the problem of functionality vs traceability trade-off. This raises the question of to which extent economic agents consider the fact of privacy/anonymity of money important, to which extent they are willing to sacrifice convenience for the sake of anonymity, and to which extent their choices are driven by the propensity for equality, individualism, and hierarchies.

In contrast to studies with laboratory experiments (Borgonovo et al (2021), Masciandaro (2018)), the article presents the results of the analysis of respondents' surveys from different regions of the world. This gives an idea of whether cultural differences matter and whether there is a link between the choice of privacy/anonymity preferences and cultural patterns. Based on the analysis of the respondents' answers, the following conclusions can be drawn. Firstly, privacy/anonymity is indeed important in assessing the properties of money. Secondly, the convenience of digital money is recognized as an important factor in the potential demand for it. Thirdly, the denial of convenience for the sake of privacy/anonymity is due not only to cultural factors, but also to a set of other institutional reasons, including historical experience and trust in public institutions. If such institutions are not trusted, and money is not a priori seen as a guarantee of anonymity, it is easier to sacrifice it for the sake of convenience. Fourthly, cultural inclinations toward hierarchies and egalitarianism do not always clearly correspond to preferences for privacy/anonymity. Not all cultures are characterized by consistency and stability of preferences. From this, we can make assumptions about the existence of a culture of conformism, within which it is difficult to see the consistency and stability of preferences. It can be said that such conformism goes hand in hand with the historical experience of distrust of public institutions, which does not preclude tolerance of hierarchies, especially if the latter allow a positive impact on welfare. At the same time, the strong advantage of privacy/anonymity over money can coexist with the rejection of hierarchies and egalitarianism, and vice versa, which contradicts the traditional approach to analysing the relationship between values and privacy (Li et al (2017), Trepte et al (2017), Omrani and Soulie (2017)).

The conducted analysis leads to more general conclusions that cultural differences and different institutional contexts will influence the choice of CBDC design. Most likely, there is no universal optimal design of digital currencies of central banks. In the future, this will raise the issue of digital fragmentation of the world and complicate the task of ensuring the interoperability of CBDC.

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