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ILLITERACY IN THE CONTEXT OF CRYPTOCURRENCIES

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The term «cryptocurrency» is widely used nowadays. Although there are different definitions, people are often talking about cryptocurrencies without having basic knowledge. People seem not to know the essential characteristics. There is often something mysterious about cryptography. We conducted a survey of students from different countries around the world about their knowledge and attitudes towards cryptocurrencies. Some of the findings in the area of financial illiteracy are presented in this paper.

Keywords: cryptocurrencies; cryptography; proof of ownership; blockchain; illiteracy.

НЕГРАМОТНОСТЬ В КОНТЕКСТЕ КРИПТОВАЛЮТ

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В настоящее время термин «криптовалюта» используется все чаще. Несмотря на то, что существуют различные определения данного термина, базовые знания у людей относительно него еще не сформированы. Иногда кажется, что люди не понимают сущности данного явления. Им кажется, что в криптографии есть что-то таинственное. Мы провели опрос студентов из разных стран о знаниях и отношении к криптовалютам. В данной статье представлены некоторые результаты данных исследований.

Ключевые слова: криптовалюты; криптография; свидетельство о праве собственности; блокчейн; неграмотность.

Introduction. The term ‘cryptocurrency’ is widely used nowadays. The term was used for the first time in the context of the development of Bitcoin, which was created by Satoshi Nakamoto in 2009 as a decentralized cryptocurrency [1]. At the beginning of 2018 Lansky came up with a more technical definition of cryptocurrencies [2]. In March 2018, the word ‘cryptocurrency’ was added to the Merriam-Webster Dictionary [3]. Mid of 2018, a report of the European Parliament, which discusses and summarizes the subject of cryptocurrencies as it has been scrutinized by several policy makers like the European Central Bank, the International Monetary Fund, the Bank for International Settlements or the European Banking Authority.

Although there are different definitions, undoubtedly ‘crypto’ is part of the term. ‘Crypto’ is also part of the term ‘cryptography’. In the context of cryptocurrencies this means that

somehow cryptographical algorithms are used for the security of cryptocurrencies. Secure data transfer in the Internet means that cryptographical methods are needed.

In a study with business students from all over the world we wanted to find out how much do they know about cryptocurrencies. We did this study in the context that there is also confusion because of different definitions [4]. Our hypothesis is that there is not only confusion. There is also illiteracy.

Literature Review. When Satoshi Nakamoto described the concept of Bitcoin in a whitepaper, he didn't use the term. He described the problems of existing central bank issued currencies and the concept of a digital currency that uses cryptographic algorithms and blockchain technology to eliminate non-trustworthy intermediaries [1]. According to Lansky, a cryptocurrency fulfils the following conditions: There is no central authority, like a central bank needed, because of a consensus mechanism. The system itself is consistent and has an overview of all cryptocurrency units and their owners. The system defines the process and the conditions of creating new cryptocurrency units. The ownership of cryptocurrency units can solely be proved using cryptographic algorithms. The system allows transactions. A transaction means that the ownership of a cryptocurrency unit is changed. Therefore, the current ownership has to be proved. If there are two different transactions initiated at the same time concerning a single cryptocurrency unit, the system performs only one of them [2].

Research Method and Data Collection. We collected data from business students around the world. We are asking business students, because they should have at least basic knowledge about economics and the finance industry. We are asking young people because they have often a higher affinity and a higher adoption rate of new technologies, e. g., smartphone banking. In 2019, 63 % of people in Germany in the age between 16 and 29 are smartphone banking users, but only 29 % of people, who are 65 and older [5]. We are asking students from countries with different regulations, but also countries with similar regulations.

We received answers from 643 students. Round about 60 % of the students are female, 40 % are male. Round about 85 % of the students are between 16 and 24 years old.

We asked the participating students about their knowledge of cryptocurrencies. This self-assessment we used to build two groups. We have one group (group A) with students, who see themselves as experts or at least that they have a lot of knowledge and a second group (group B), who has less knowledge about cryptocurrencies. In group A, we have 159 students. This means 24,73 %. In group B, we have 484 students. This means 75,27 %.

Results, Analysis and Discussion. We asked for essential characteristics of cryptocurrencies. Overall less than 50 % of the participants (43,70 % of all participants, 48,43 % of group A) think that cryptography is essential. This means that more than half of the participants did not realize what components the term 'cryptography' is made of. Even more than half of the participants in group A didn't realize this. If we look more in detail on a country level, we can see that there are countries like Germany or India, where the proportion of students in group A, who said that cryptography is essential, is smaller than the whole group in the country. The numbers of US students have to be read carefully, because the number of participants was very small. Details are shown in figure 1.

Regarding a χ^2 value of 0,834, we can conclude that participants of group A do not have significant more knowledge than group B. If we analyze the data more in detail, only in China participants in group A have significant more knowledge.

Another statement, which had to be evaluated by the participants, was 'Ownership of cryptocurrency units can be proved exclusively cryptographically'. According to [2] this is a characteristic of cryptocurrencies. However, cryptography is necessary for secure authentication in the Internet. This is only a partial aspect. The approval rate to this statement is higher in group A except Poland and the USA. As mentioned earlier, in the USA the number of participants was too small. It is also interesting to see that in India in total more participants say that the ownership can be proved exclusively cryptographically than participants see

cryptography essential for cryptocurrencies (figure 2). According to the χ^2 values group A has in total a significant higher knowledge. In detail, only in Russia the hypothesis is confirmed.

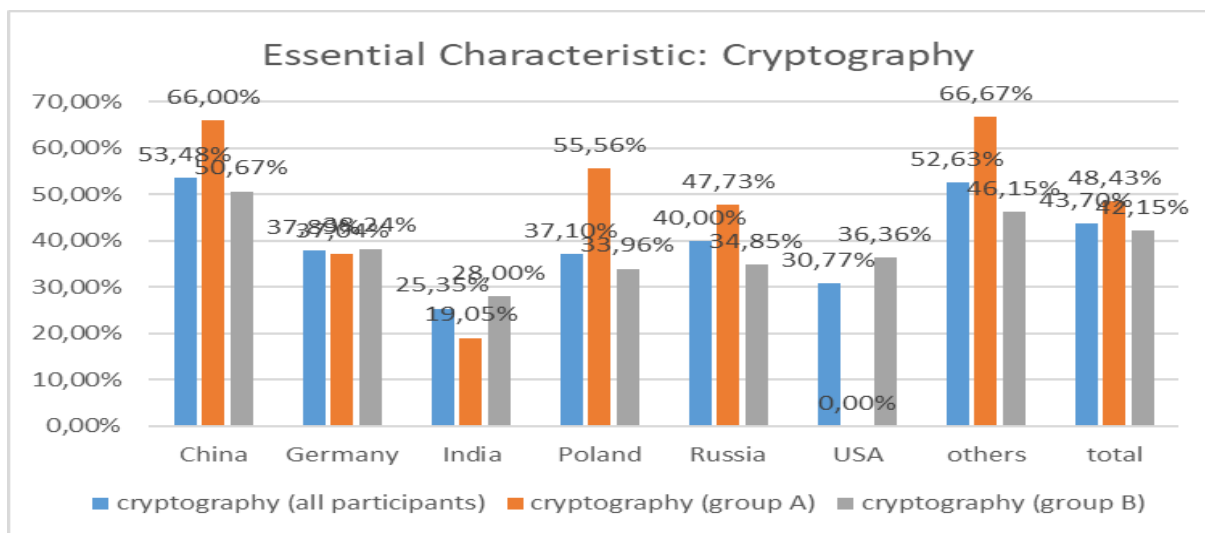


Figure 1 – Cryptography

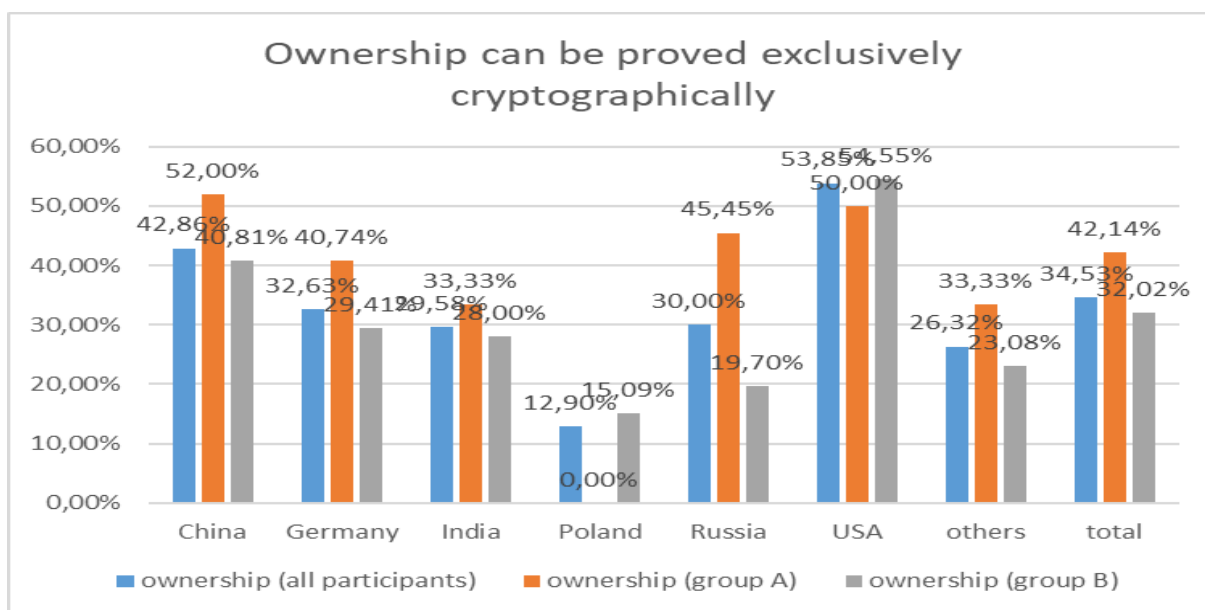


Figure 2 – Proof of Ownership

Realizing this inconsistency, we have analyzed the data more in depth. We can see that in total nearly 15 % of the participants say that cryptography is not essential, but ownership can be proved exclusively cryptographically. In group A this proportion is much smaller, but still 4,35 % (figure 3).

Also, the blockchain technology uses cryptographical algorithms to make sure that there is no manipulation or the risk of manipulation is low. This is maybe not so obvious. However, participants in group A, who consider themselves to be knowledgeable, should know this.

If we select these participants, who say that cryptography is essential and ownership can be proved exclusively cryptographically and the distributed ledger technology, e. g., using blockchain technology is necessary, we have in most countries only small proportions (figure 4).

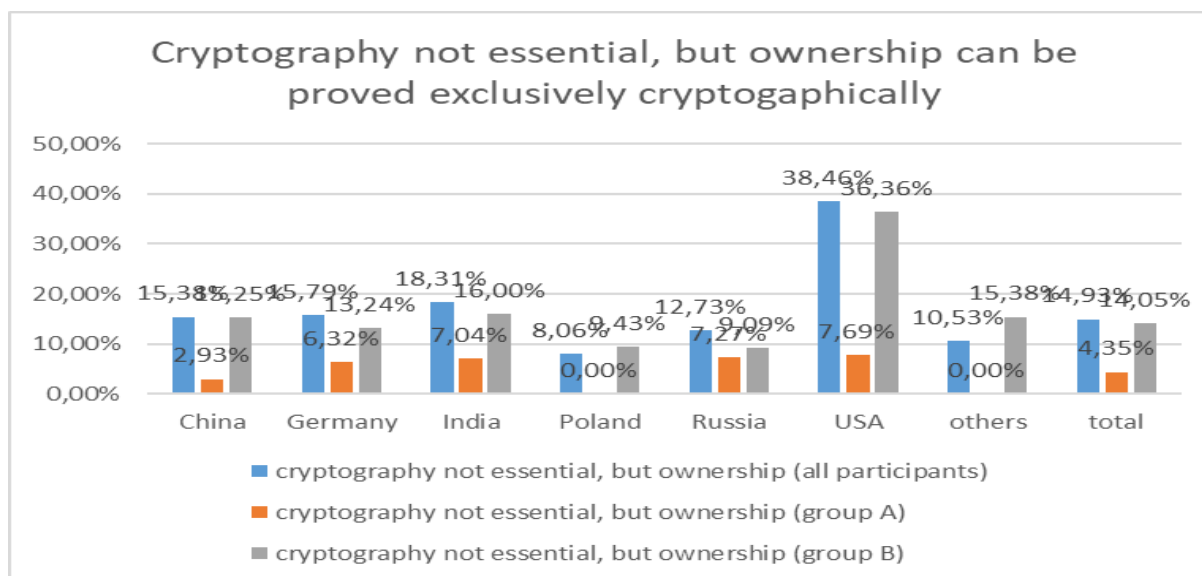


Figure 3 – Cryptography and Proof of Ownership

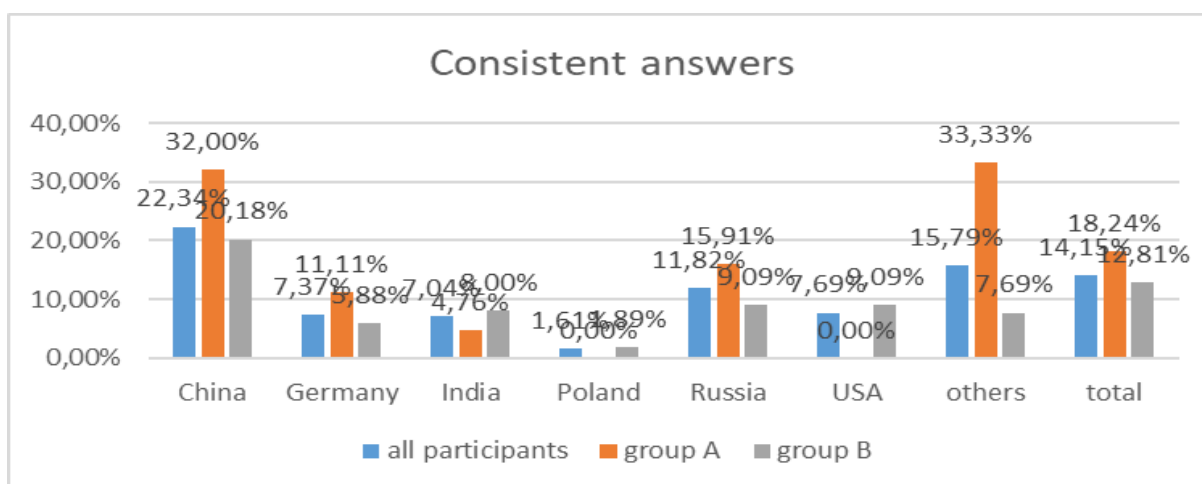


Figure 4 – Consistent Answers

Because of different numbers of participants in different countries, the absolute numbers are interesting to look at (figure 5). Except China, the number of consistent answers is small.

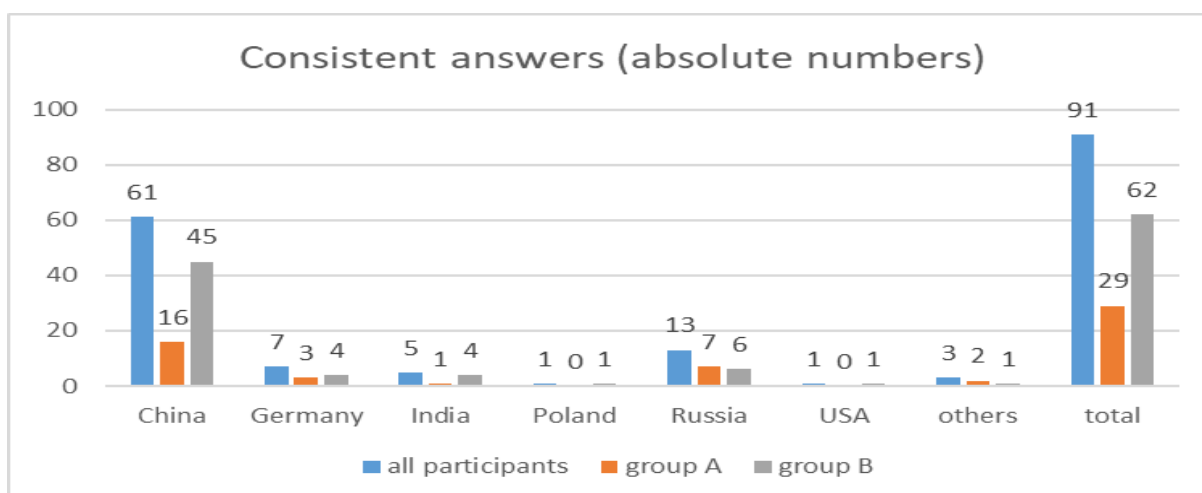


Figure 5 – Consistent Answers (absolute numbers)

Conclusion. In most countries we have only a small number of consistent answers. This means that we have a relatively high illiteracy regarding to cryptocurrencies and their characteristics. There is not a big difference between these participants, who see themselves as knowledgeable, and those participants, who see themselves as less knowledgeable. This is worrying and leads to further research questions, e. g., What are the reasons? but also Which consequences does this have? and Are there correlations with other areas?

Although illiteracy is high, more than 30 % of participants in our survey is interested to make transactions using cryptocurrencies and more than 12 % answered that have already used cryptocurrencies for payments. Close to 20 % answered that they would accept salaries in cryptocurrencies and another nearly 30 % answered that they would accept salary payments at least partly in cryptocurrencies. Close to 30 % answered that they think that cryptocurrencies have the potential to substitute currencies issued by central banks.

Nevertheless, this research has also some limitations. Although there is a quite big number of participants from all over the world, the survey is not representative. We deliberately only conducted the survey among business students, because we assumed that their understanding is above average.

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THE IMPACT OF GREEN INVESTMENT ON CHINA'S ECONOMIC GROWTH¹

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Using China's provincial panel data from 2003 to 2020, a two-way fixed effect model is established to empirically study the impact of green investment on China's economic growth, and to explore regional heterogeneity. The results show that green investment can significantly promote the China's economic growth, and there is regional heterogeneity. In the Eastern and Central regions, green investment can significantly promote economic growth, but not in the Western region.

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