

DIGITAL CURRENCY AS A COMPONENT OF THE GLOBAL DIGITAL ECONOMY

^aMARYNA HORDIENKO, ^bOKSANA PERCHUK, ^cIRYNA BONDARENKO, ^dVITALII SVICHKAR, ^eOLHA KRONDA

^a*Department of Social and General Technical Disciplines, Faculty of Engineering and Economics, Admiral Makarov National University of Shipbuilding, Mykolaiv, Ukraine*

^b*Department of finance, accounting and taxation, Hryhorii Skovoroda University in Pereiaslav, Pereiaslav, Ukraine*

^c*Department of the Financial Law of the Yaroslav Mudryi National Law University, Kharkiv, Ukraine*

^d*Department of International Economic Relations and Tourism, National university "Yuri Kondratyuk Poltava Polytechnic", Poltava, Ukraine*

^e*Department of Intellectual Property and Information Law, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
 email: ^a*hordienko_maryna@ukr.net*, ^b*ruru23@ukr.net*,
^c*irina.bon.kh11@gmail.com*, ^d*sval13311@gmail.com*,
^e*kronda.olga@gmail.com*

Abstract: Recently, virtual currency or digital money has become widespread in the world economy. The purpose of the research is to try to explain the reasons for the emergence of electronic money, their role, benefits, and risks to the global digital economy from the standpoint of syncretic logic. The value of Bitcoin USD (BTC-USD) in the financial market for the period 17.09.2014 – 30.11.2021 has been used in the research. Based on the closing price, profitability and volatility for different time periods are calculated in order to quantify the risks of new digital currencies. The results attest to the fact that in the digital economy, separate segments of the digital payment instruments market are developing, where specific information is sold and bought, designed to meet specific consumer needs and is not suitable for use as a general equivalent. On the other hand, the practice of using digital monetary units has not yet become so widespread that would allow considering them not as a surrogate for money, but as an independent form of money and collecting empirical material necessary and sufficient for analysis. The cryptocurrency market is growing rapidly forasmuch as the financial product, bitcoin, is popular with investors, the demand for which is growing significantly. It has been revealed that bitcoin acts as an object of purchase and sale in the financial market, the value of which is established thanks to another common equivalent, in particular, the US dollar. Along with this, the profitability level fluctuates significantly, and volatility depends on market conditions and various environmental factors, fluctuating significantly with the slightest changes. The dynamics of prices indicate a gradual increase in the value of the cryptocurrency, despite the fall in its price, depending on various factors. The growing popularity of the currency is evidenced by the expansion of its issue volume and the growth of the market as a whole.

Keywords: digital money (currency), electronic money, digital economy, cryptocurrency.

1 Introduction

One of the strategic directions of economic development at the present stage is the formation of the digital environment and infrastructure. The digital economy has a beneficial effect on the activities of business entities: it makes it possible to attract financing using digital technologies, develop e-commerce and services. It leads to changes in people's daily life, industrial relations, the structure of the economy and education. Within the conditions of innovative economy, new requirements to communications, computing capacities, information systems and services emerge. Recently, virtual currency or digital money has become widespread in the world economy. The essence of this phenomenon is studied by experts in various fields of scientific knowledge, namely: economic, legal, and political sphere.

New digital forms of money (Alipay. Libra. M-Pesa. Paxos. Stablecoins. Swish. WeChat Pay. Zelle) have different effects on the economy, including the banking sector (financial integrity, monetary policy, capital flows, antitrust law, financial stability, consumer protection, exchange rate, etc.). The dynamic development of the digital money market leads to the fact that cash and bank deposits face fierce competition and may be gradually replaced. Electronic money is a monetary value stored in electronic form, denominated in common units of account such as euro, dollar or yuan, and pegged to them. For instance, stablecoin is an increasingly popular form of electronic money.

Payment systems around the world are evolving with the advent of digital money issued by private firms and central banks. The analysis of digital currencies is a new area of research crossing

the monetary and financial economies, which will change the monetary and financial systems for many years ahead.

The purpose of the research is to try to explain the reasons for the emergence of electronic money, their role, benefits, and risks to the global digital economy from the standpoint of syncretic logic.

2 Literature Review

Digitization of money is a dynamic constant phenomenon that is characteristic of many economies around the world operating with a certain level of combination of cash and digital money. Scientific investigations examine various forms of money, from cards (Pritchard et al., 2015; Mainwaring et al., 2008) to digital wallets on mobile phones (Hughes and Lonic, 2007), cash (Kumar et al., 2011) and checks (Vines et al., 2014). The investigations examine the problems of various consequences of the impact of digital money on the economy and the activities of economic agents. For instance, money as a means of exchange between business entities in the process of labour relations is the most common problem. Pritchard et al. (2015) described how the shift from cash payments to electronic payments on London buses has influenced drivers and passengers. Ferreira et al. (2015) have investigated how Bristol Pound payments are fulfilled in the workflow of small local traders. Blumenstock et al. (2015) described a randomized controlled study showing that digital wage payments were more beneficial for employers than for workers.

Analysing the essence of digital money, it is possible to form a classification of existing monetary funds:

- 1) Traditional:
 - 1.1. Paper.
 - 1.2. Bank deposits.
 - 1.3. Securities.
- 2) Electronic:
 - 2.1. Plastic cards.
 - 2.2. Internet – money (payment systems WebMoney, Yandex.Money, PayPal, etc.)
 - 2.3. Smart cards (electronic wallet).
- 3) Digital – cryptocurrency.

Traditional money can exist in physical and digital form. They are united by the fact that they exist in the form of tokens of value, and the emission is carried out exclusively by the state.

According to the Glossary of the Committee for Payments and Market Infrastructure of the Bank for International Settlements, electronic money is defined as “the value stored electronically on a device such as a chip card or personal computer hard disk” (Committee for Payments and Market Infrastructure of the Bank for International Settlements).

Based on the provisions of the European Directive on electronic money, the following definition can be formed: “Electronic money is an electronic (including magnetically) monetary value, a claim on the issuer, issued upon receipt of funds by the issuer for making payments and accepted as a means of payment by other institutions than the issuer of electronic money” (European Union law, 2021).

The development of information technology has led to the emergence of a new form of money – digital or virtual, which is commonly called cryptocurrency. Digital money at this stage of development does not have a stable developed legal framework.

Depending on the purpose and method of use, the European Central Bank has classified the virtual currency into the system groups as follows:

- currency with the possibility of conversion, that is, bilateral exchange (Bitcoin);
- currency for use in online games (Worlds of Warcraft);

- currency with the possibility of exchange only in one direction (“miles” of airlines, sold by airlines in loyalty bonus programs in relation to regular customers).

Digital money is widespread in the global economy, most basically in developed countries (North and South). The exception is the proliferation of e-funds in the sectors of low-income economies in the Global South. Mobile money, that is, money processed by mobile phones, is widely promoted in sectors of the developing economy. These trends are related to security, ease, and speed of conducting transactions anywhere and at any time. Therefore, researchers claim about spreading digital money and its penetration into the financial system and various sectors of the economy (Scharwatt et al., 2014; Pickens et al., 2009). For organizations, the use of digital funds provides a reduction in the costs and risks connected with cash transactions (Blumenstock et al., 2015); consequently, this form of money is a promising solution for the private sector. However, it is quite difficult to encourage potential end-users, who often work in an informal economy with significant cash flow.

Digital money systems tend to address the shortcomings of other payment mechanisms by fulfilling payments in fast and secure way (Ondrus et al., 2009; Balan et al., 2009; Lehdonvirta et al., 2009) or even nearly invisible to users (Lehdonvirta et al., 2009). For instance, Balan et al. (2009) and Lehdonvirta et al. (2009) focus on compromise between usability and security in projects of new mobile money systems. Ease of use is measured in the laboratory in terms of speed, “cognitive load” and perceived safety. These systems focus on improving the payment transaction compared to other means of payment by minimizing the costs connected with this transaction. However, scientific investigations, examining payment systems in vivo (outside the laboratory), reveal significant challenges in the spread of e-money and lower security, speed, and simplicity. For instance, Ferreira and Perry (2014), studying the Bristol pound (community currency in cash or mobile form), revealed that transaction speed was not the only problem for users, forasmuch as the social context in which transactions took place had implications for user experience (Ferreira et al., 2015). Mainwaring et al. (2008) investigated various forms of money used in day-to-day operations in Japan. They revealed that the perceived effectiveness and usability of digital technologies were not the most significant factors in their acceptance in the society. The most important factors in the use of electronic money were how well different forms of payment meet the social and cultural requirements of payment in a particular country. Kumar et al. (2011) examined features of small cash payments in India, highlighting the importance of various payment practices such as bargaining, service support (for instance, when buying train tickets) and reusing receipts. Vines et al. (2012) examined the use of checks by people over the age of 80 and described how, for this generation, checks are part of a “trust ecosystem” that current digital technologies have not achieved yet. Although laboratory investigations may focus on the payment transaction as a relatively isolated and simple transaction, in the real world, digital money, embedded in social practice, is characterized by social significance (O’neill et al., 2017). From the studies mentioned above, it is clear that the form of money – cash, card, or mobile money – influences the way money is used and comprehended.

Adrian & Mancini-Griffoli (2019) have developed a conceptual framework for comparing traditional forms of money with their new digital equivalents. The possible benefits and risks of using digital money have been considered in the scientific work, as well as it has been determined that some forms of digital money, despite the lower level of stability as a store of value, can be quickly adopted due to the advantages as a means of payment. One of the approaches to risk management is the requirement of full provision of the selected digital money with central bank reserves. Adrian & Mancini-Griffoli (2019) call this scheme the Synthetic Central Bank Digital Currency (sCBDC), a public-private partnership combining the benefits of private sector

innovation and customer-centered orientation with the security and stability provided by the central bank.

3 Materials and Methods

The purpose of the research is to try to explain the reasons for the emergence of electronic money from the standpoint of synthetic logic, which has been chosen as the methodological basis for studying the emergence and change of types and forms of money, and taking into account the evolution of technological processes. Evolution is caused by the necessity to search and select new alternative methodological fundamentals for studying the innovative development of the economy as a result of not always successful attempts to explain the innovations of the modern world. In much the same way that Internet banking, for instance, which has supplanted the functioning of banking institutions and offices for centuries, changes the way the banking business exists and the nature of its perception by customers; consequently, a global transformation of the whole economic system is taking place, entailing similar changes in the ways of studying the surrounding reality.

The value of Bitcoin USD (BTC-USD) in the financial market for the period of 17.09.2014–30.11.2021 has been also used in the research, including closing, opening, minimum and maximum cryptocurrency prices. Based on the closing price, the yield and volatility for different time periods has been calculated in order to quantify the risks of new digital currencies.

In order to calculate the yield of Bitcoin USD (BTC-USD), the following formula was used:

$$R_t = \log \log \left(\frac{I_t}{I_{t-1}} \right) \quad (11)$$

where I_t – price of the share at the time of market closing.

The standard deviation based on closing prices was used to calculate volatility. Volatility is an important indicator of the financial market that makes it possible to assess the change in the price of an asset over a period of time and evaluate the risk of future price changes. The difference between the minimum and maximum price of the share was also used to calculate volatility (Average True Range).

4 Results

The last years of the XX century were marked by a new stage in the development of commodity – money relations: the emergence of electronic money. The essence of electronic money in the present research is revealed in its interrelation with digital technology.

The word combination “electronic money” began to appear in the scientific works of specialists in the 1970s due to the emergence of information technology, which provided effective information processing when performing routine operations with a focus on centralized collective use of resources of data centres. The major direction of information technology development was the automation of human operations and the development of automated production management systems and process control, including customer banking technology. The first attempts to interpret electronic money were related to the technological processes of storage, processing and transmission of information in the framework of non-cash settlements and payments. Over the past few decades, the concept of electronic money has noticeably changed and improved in parallel with the evolution of information technology and computer technology, constantly expanding the scope and methods of their dissemination.

The technological aspect of the functioning of electronic money has a significant impact on the formulation of this category. The interpretation of electronic money in detail is often carried out in the context of the technical component. Probably, in the process of further evolution of information technologies, such interpretations may far too frequently lose their relevance and require additions and clarifications. For instance, the emergence of cryptocurrencies in

2009–2010, operating on the basis of Blockchain technology, has dramatically changed the perception of possible ways to create and use electronic money. However, it is apparently impossible to completely abandon the technical aspect, due to the need to single out electronic money as an independent and distinct category of scientific theory. In addition, currently, there is a problem with the use of synonyms in this category, namely: “virtual money”, “cryptocurrency”, “network money”, “digital currency”. The use of these terms emphasizes either technological features, or the sphere of circulation, or the form of existence, or the functional purpose of a new form of a general equivalent. However, in the presence of numerous attempts to reveal the essence and specifics of electronic money, the issue of determining the scale of prices and value content of the electronic currency is not taken into account. From the first attempts to investigate the origin of money and its individual forms, according to the viewpoints of historians and economists, this should have been explained by the metrology – a special science of the weight, composition and technique of money. Values and weights are not the result of creativity and invention; however, it is the product of a long natural-historical and cultural evolution. There is a complete correlation between primitive money, the so-called money – goods, for instance, cattle, and the minted coins of civilized peoples, in this case, a hereditary interrelation.

By analogy with full-bodied money, the price scale of which was determined by the weight content of the noble metal in the monetary unit, the price scale of the electronic monetary unit should be determined by the volume and value of information. It is well known that the minimum unit of measurement of information displayed on electronic media is calculated in bits. The word “bit” is of English origin, which means “binary digit”. If one looks at this value from the other side, it can be said that this is a memory cell in electronic computers, which is stored in the form of two digits: 0 or 1. It is no coincidence that one of the most famous crypto currencies in the world, causing an extremely contradictory and ambiguous attitude towards itself nowadays, is called “Bitcoin” (from the English “bit” – a unit of information, “coin” – “coin, piece of money”). Thus, we believe that the form of the general equivalent being investigated from the standpoint of the digital content of the price scale, and not only electronic technologies for storing and transferring monetary units, it would be more logical to call digital rather than electronic money, or to use both terms in parallel (“Bitcoin” is called, for instance, not only crypto, but also digital currency). The academic paper proposes to use the following definition of digital (electronic) money: “Digital (electronic) money is the information embodiment of the general equivalent reflected on electronic (computer) media”.

The proposed interpretation of digital money can be considered as the first step in the study of determining their value and purchasing power as an independent form of general equivalent, patterns of turnover in relation to other forms of money and commodity weight, searching for evaluation parameters in order to measure their volume and degree of participation in transactions, selection of tools to regulate their turnover.

Determining the value of a digital currency remains an unresolved issue and requires establishing the value of an information unit embodying the general equivalent. Currently, there are objective conditions that prevent the solution of this problem. On the one hand, the information market as an object of purchase and sale is just emerging. So far, it is only possible to talk about the emergence of separate segments of such a market where specific information is sold and bought, designed in order to satisfy certain consumer needs, and it is not suitable for use as a general equivalent. On the other hand, the practice of using digital monetary units has not yet received such a spread to that extent that would allow considering them not as a surrogate for money, but as an independent form of money and collecting empirical material necessary and sufficient for analysis. Currently, judgments about the value of digital money can be made only based on the dynamics of prices for them as a financial product (Figure 1). The cryptocurrency market is growing rapidly forasmuch as the financial product bitcoin is popular with investors, the demand for which is growing

significantly, especially for the period from 18.05.2019 to 30.11.2021. In this case, bitcoin acts as an object of purchase and sale in the financial market, the value of which is determined by another general equivalent, in particular the US dollar, in light of the fact that bitcoin is characterized by a high level of risk of price changes, volatility. At the same time, the level of yield fluctuates significantly (Figure 2), and volatility depends on market conditions and various environmental factors, fluctuating significantly at the slightest changes. For the period 17.09.2020 – 30.11.2021, the value of cryptocurrency has decreased by 3%; it is characterized by sharp fluctuations in the closing price (for instance, on 21.10.2020, the closing price increased by 8%, on 05.11.2020 – by 10%, on 26.11.2020 – it decreased by 8%, on 16.12.2020 – it increased by 12%, on 13.01.2021 – in increased by 10%, etc.). The dynamics of prices indicates a gradual increase in the value of the cryptocurrency, despite the fall in its price, depending on various factors. The growing popularity of the currency is evidenced by the expansion of the volume of its issue and the growth of the market as a whole.

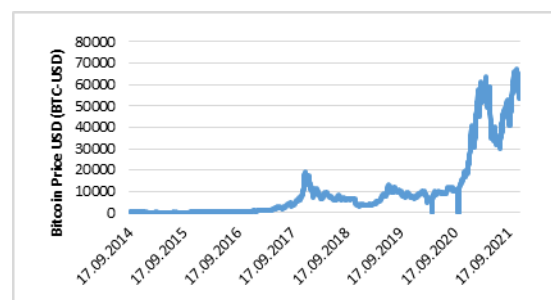


Figure 1. Dynamics of prices of Bitcoin USD (BTC-USD) in the financial market, 17.09.2014–30.11.2021

Source: YahooFinance (2021).

Along with this, the yield of bitcoins also varies significantly depending on the value in the financial market, and the average yield value varies depending on political, economic conditions. For instance, for the period 18.09.2014 – 18.09.2017, the yield was 0,0632%, for the period 18.05.2017 – 18.05.2018 – the yield was 0,1781%, decreasing in the period of 18.05.2018 – 18.05.2019 to level – 0,0127 % (Table 1).

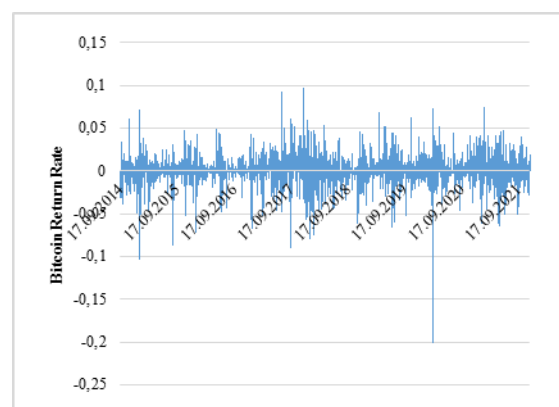


Figure 2. Dynamics of the yield of Bitcoin USD (BTC-USD) on the financial market, 17.09.2014 – 30.11.2021

Source: compiled by the author on the basis of YahooFinance (2021).

Table 1. Changing the volumes of the market of Bitcoin cryptocurrency, yield, volatility for the period 17.09.2014–30.11.2021

Period	Average Volume	Yield, %	Volatility	Standard deviation of volatility
18.09.2014–18.05.2017	93 772 063,5	0,0632	18,543	24,985

18.05.2017– 18.05.2018	5 445 493 871	0,1781	606,204	641,129
18.05.2018– 18.05.2019	6 984 405 363	-0,0127	200,564	171,271
18.05.2019– 18.09.2020	26 322 281 743	0,0338	390,405	327,158
18.09.2020– 30.11.2021	44 967 570 971	0,1622	2418,922	1698,752

Source: compiled by the author on the basis of YahooFinance (2021).

The volatility of cryptocurrencies is at a high level, the difference between the maximum and minimum price of bitcoin grows significantly with the growth of the market (2418,922 for the period 18.09.2014–30.11.2021). Thus, the risks of cryptocurrency are extremely high due to its instability as a financial product and relative novelty.

5 Discussion

The future of virtual currencies is an issue that worries many financial analysts, legal scholars and market participants. The transformation of the global economy is an obvious consequence of the progress of the digital market. Blockchain provides an opportunity for humanity to obtain innovative products giving rise to new forms of business existence. Blockchain significantly changes trade and currency relations, forasmuch as it does not require the participation of intermediaries. In this regard, the interests of banking and government agencies are taken into account. However, the confrontation between the state and modern science does not allow making unambiguous predictions. The modern social environment requires the development of innovative technologies in all spheres of the society. Young scientists are ready to go beyond in their activities and create new rules of life, changing the consciousness of the society. A rather strong lobby on the part of financial corporations does not guarantee victory over the uncontrolled way of conducting digital commerce.

Cryptocurrency makes it possible to develop trade relations on a full basis without intermediaries, only with the participation of a buyer and a seller. However, the security of transactions is one of the main problems in the distribution of virtual money. Cryptocurrency provides significant benefits, including as follows: 1) minimum transaction fees, 2) security, 3) speed, 4) ease of storage 5) relevance in the digital age (Balan et al., 2009). However, cryptocurrency has not become widespread in everyday life as a means of payment, which is primarily due to its relative novelty and functioning as a way of exchange only for the last 10 years. According to several scholars' viewpoint, this may lead to a rapid change in the situation (Blumenstock et al., 2015). At the same time, according to experts' assessments, if the current dynamics is maintained, the number of blockchain wallet users will have reached 200 million by 2030, and in the future, cryptocurrency will completely replace cash (Hardy, 2017).

The state is trying to protect itself from the flow of criminal violations, fraud on condition of anonymity of cryptocurrency transactions. Users are waiting for guarantees in order to protect digital transactions from viruses and hacking.

In order to move to a new consumer level, cryptocurrency should overcome three main obstacles (Adrian & Mancini-Griffoli, 2019), namely:

- 1) the value of cryptocurrency should be more stable, it should be convenient for both sellers and consumers. It is necessary to ensure the transition of virtual currency into a legitimate legal field;
- 2) integration of cryptocurrency by leading companies in the field of payments. In particular, these are mobile applications – Apple Pay, Google Pay, among the card providers, these are Visa and Mastercard, and among retailers, these are Amazon and Walmart;

- 3) in order to implement a full transition to fully digital platforms, the financial system should be prepared for power outages and cyberattacks. In parallel with the processes described above, fiat money systems, in turn, should be characterized by a tendency to instability; they should be subject to high inflation, giving up a competitive position in relation to non-fiat money.

The cryptocurrency rate directly depends on supply and demand. A serious decline in the network of bitcoin and other cryptocurrencies was observed in January 2018. In this regard, a number of countries have moved to a new level of regulation of digital currencies. As a result, in the US, the requirements for transparency of agreements were tightened. The US Internal Revenue Service was investigating the case against the Coinbase marketplace, as a result of which the service demanded to obtain information on participants in transactions exceeding 20 thousand USD. From 2013 to 2015, up to 900 tax returns were submitted; consequently, the desire of the US regulator to monitor the process of paying taxes is obvious (Ferreira & Perry, 2014). As a result of reforms in the United States, many cryptocurrency exchanges have been closed. The government of South Korea has made it incumbent for commercial institutions to verify the identity of customers prior to conducting transactions in virtual coins. Thus, the inhabitants of the peninsula will no longer be able to carry out transactions anonymously in bitcoins and altcoins.

The desire of the authorities to make the exchange of virtual money more transparent is becoming tangible. From the first days when altcoins attracted the attention of investors, they were preferred because of anonymity. After the intervention of the supervisory authorities, digital coins lost their original attraction. The promotion of cryptocurrency requires its recognition at the legal level. However, with the advent of regulation, it is necessary to abandon the principles that have been originally laid down in the blockchain (Kumar, Martin & O'Neill, 2011). It is important to find a balance between freedom and control in order to ensure the willingness of investors to invest in promising projects.

6 Conclusion

Digital money is more convenient as a means of payment; however, the issue arises concerning the stability of its value. Digital currency becomes a private equity fund ensuring redemption at par. As a result, banks will be under pressure on the part of e-money requiring them to respond by offering more attractive services. New participants in the payment industry may become banks one day and offer targeted loans based on the information obtained. Thus, the banking model as such is unlikely to disappear. Central banks will play an important role in shaping this future. The rules set by them will have a significant impact on the adoption of new digital money and the pressure it puts on commercial banks.

In the digital economy, separate segments of the digital payment instruments market are developing, where specific information is sold and bought, designed to meet strictly defined consumer needs and unsuitable for use as a general equivalent. On the other hand, the practice of using digital currencies has not become so widespread yet. The cryptocurrency market is growing rapidly; bitcoin as the financial product is popular with investors, the demand for which is growing significantly. The value of digital money is determined by another general equivalent, the US dollar, in particular. At the same time, the level of profitability fluctuates significantly, and volatility depends on market conditions and various environmental factors, fluctuating significantly with the slightest changes. The dynamics of prices indicates a gradual increase in the value of the cryptocurrency, despite the fall in its price, depending on various factors. The growing popularity of the currency is evidenced by the expansion of the volume of its issue and the growth of the market as a whole.

Literature:

1. Adrian, T., & Mancini-Griffoli, T. (2019). The rise of digital money. *Annual Review of Financial Economics*, 13.
2. Balan, R. K., Ramasubbu, N., Prakobphol, K., Christin, N., & Hong, J. mFerio: The design and evaluation of a peer-to-peer mobile payment system.(2009). *MobiSys* , 9, 22–25.
3. Blumenstock, J. E., Callen, M., Ghani, T., & Koepke, L. (2015, May). Promises and pitfalls of mobile money in Afghanistan: evidence from a randomized control trial. *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development*, 1–10.
4. Committee for Payments and Market Infrastructure of the Bank for International Settlements. A glossary of terms used in payments and settlement systems. Available at: <https://www.bis.org/dcms/glossary/glossary.pdf?scope=CPMI&base=term>.
5. European Union law (2021). Directive 2000/46/EC of the European Parliament and of the Council of 18 September 2000 on the taking up, pursuit of and prudential supervision of the business of electronic money institutions. <http://data.europa.eu/eli/dir/2000/46/oj>.
6. Ferreira, J., & Perry, M. J. (2014). *Building an Alternative Social Currency: Dematerialising and rematerialising digital money across media*. Proceedings of HCI Korea (HCIK '15). Hanbit Media, Inc., Seoul, KOR, 122–131.
7. Hardy, J. (2017). Money,(co) production and power: The contribution of critical political economy to digital journalism studies. *Digital Journalism*, 5(1), 1–25.
8. Kumar, D., Martin, D., & O'Neill, J. (2011, May). The times they are a-changin' mobile payments in india. *Proceedings of the SIGCHI conference on human factors in computing systems*, 1413–1422.
9. Lehdonvirta, V., Soma, H., Ito, H., Yamabe, T., Kimura, H., & Nakajima, T. (2009, September). Ubipay: minimizing transaction costs with smart mobile payments. *Proceedings of the 6th international conference on mobile technology, application & systems*, 1–7.
10. Mainwaring, S., March, W., & Maurer, B. (2008, April). From meiwaku to tokushita! Lessons for digital money design from Japan. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 21–24.
11. O'neill, J., Dhareshwar, A., & Muralidhar, S. H. (2017). Working digital money into a cash economy: The collaborative work of loan payment. *Computer Supported Cooperative Work (CSCW)*, 26(4), 733–768.
12. Ondrus, J., Lyytinen, K., & Pigneur, Y. (2009, January). Why mobile payments fail? Towards a dynamic and multi-perspective explanation. In *2009 42nd Hawaii International Conference on System Sciences*, 1–10. IEEE.
13. Pickens, M., Porteous, D., & Rotman, S. (2009). Banking the Poor via G2P payments. *Focus Note*, 58.
14. Pshenichnikov, V., Ivanova, N., & Tomsinskaya, I. (2019, March). Identification of types and properties of electronic money in the digital economy on the basis of interdisciplinary integration of knowledge. In *IOP Conference Series: Materials Science and Engineering*, 497, 1, 012084. IOP Publishing.
15. Scharwatt, C., Katakam, A., Frydrych, J., Murphy, A., & Naghavi, N. (2014). State of the Industry 2014: Mobile Financial Services for the Unbanked. Available at: http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/03/SOTIR_2014.pdf. 14/03/2017.
16. Vines, J., Dunphy, P., Blythe, M., Lindsay, S., Monk, A., & Olivier, P. (2012, February). The joy of cheques: trust, paper and eighty somethings. *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*, 147–156.
17. YahooFinance (2021). Bitcoin USD (BTC-USD). Available at: <https://finance.yahoo.com/quote/BTC-USD/history?p=BTC-USD>.

Primary Paper Section: A**Secondary Paper Section: AH**