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Monetary History and Money Types in Digital Economy

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***Abstract*—The history of monetary supply in a digital economy is a matter of concern in the paper. In fact, the dynamics of all economy fields provoke monetization and development of new types of money. Furthermore, the opposite interdependent process is also possible, i.e. the diversity of money contributes to the advancing of economy development and society in general. The article dwells upon the development and current situation in introducing electronic money and electronic funds transfer systems in Russia. The authors review the main stages of monetization, its development and current affairs in the context of economic globalization and digital technology development. It proves the necessity to maintain total financial supervision on the part of the government in the society, since electronic money ramps up payment disintermediation that is facilitated by means of information technology at present-day time. The authors point out the facts mentioned above to be the introduction of unique monetary phenomena in modern economy that are worth to be scientifically-based.**

Keywords—digital currency, information-related capital goods, information services, digital technologies, electronic money, digital economy

I. INTRODUCTION

The main economic property is that a characteristic criterion of it is a special gear to generate wealth. The issues of origin, sources, and key development stages of well-being have been urgent and applicative throughout the social history. The steps of historical social maturity can be classified according to a layer hierarchy of its construction and the degree of dealing with information. A key and basic principle of such a category is a parameter. According to it, the level of social maturity is determined by the level of technology development together with information processing, exchange, distribution and literacy. There is social information that appears as a system of knowledge about nature, economy and society. Moreover, goods represent a certain kind of information. All goods are information devices brought into them. Money is a medium of goods exchange, i.e. a universal value equivalent. It can be admitted that information becomes money. The social development requires a detailed recording of the current economic conditions for money circulating in the digital economy.

A great number of scientific studies observe money circulation principles in the digital era. Y. M. Akatkin et al. [1], D. A. Kochergin [2], E. S. Sadovaya [3], A. V. Lavrukhin [4] considered the development and current matters of electronic money systems, payments in major Asian financial centers, peculiarities of digital industry, trends of expanding state and private partnerships, and providing competitive conditions in order to promote rapid growth of available reasonable digital services at present. G. A. Bannykh et al. [5], V. O. Kalyatin [6] attempted to explore, identify and determine the population's information demands in demographic and economic issues, problems in defining the public domain in the modern information society. G. U. Soldatova [7], S. V. Volodenkov [8] reviewed the new methods of analyzing digital reality. R.

Remeikiene et al. [9] observed the features of digital shadow economy at present. A. P. Balcerzak and M. B. Pietrzak [10] investigated the features of digital economy with a global reach. However, it should be highlighted that those aspects do not seem to be developed completely, taking into account the present-day conditions and monetary development in digital era. On the contrary, this requires further theoretical and applied studies. The great importance and immaturity of the reviewed topic provide definite relevance and novelty of this research.

The purpose of the study is to distinguish the diversity of money and the main stages of monetary supply evolution in digital economy. It will provide the essentiality for the government financial control of the Russian economy nowadays. The authors consider these problems as highly relevant. So they need to be solved both theoretically and practically.

II. Research Methodology

The theoretical and methodological basis of the research is the conceptual provisions of fundamental and applied studies of leading scientists on accepting, using money and digital economy of a contemporary society.

III. Results and Discussion

D.S. Robertson, referring to the interrelated link between civilization and information processes, proposed the following formula: "civilization means information". The scientist ordered the societies existed according to the criterion of information having given and being given and absorbed by them:

1) Level 0 - information capacity of an individual's mind;

2) Level 1 - verbal communication in a community, a village or a tribe;

3) Level 2 - written culture;

4) Level 3 - book culture;

5) Level 4 - an information society with electronic information processing [11].

This approach implies a fundamental category to comprehend historical development by the notion *information*. It is meant as a universal unit to measure social facts for all types of society (land, industrial, information ones). A large amount of new accumulated information leads to an innovative reform of the society and the economy as a whole. So, the information covers far-reaching reforms of the economic structure aimed at converting to a whole new stage of development. Although, according to N. Beck, the main economic characteristic of the society is the high standard of knowledge needed for the basic economic branches. The knowledge level index was 14.7 % in the agriculture economy (1880-1918), it was 18.0 % in the industrial economy (1918–1998), and it is 48.9 % in the information one (1981–2035) [12].

According to the information theory of money, the main devices of monetary information correspond to the appropriate societies: 1) Gold in a rural/land society; 2) Paper in an industrial society; 3) An electronic device in an information society.

These societies have their own financial epochs and reflect a proper period.

The first stage of wealth development covers the era of a land society from the Neolithic Revolution to the end of the 18th century. In those times, money reflected economic relations between separate manufacturers. The problem has been mostly updated recently. It has been happening in the context of extensive globalization since the beginning of the Age of Discovery/Exploration and the New World. Exploring the economic phenomena of that time, mercantilists considered money equal to wealth, and gold was accepted as money [13].

In the later periods of the land society when agriculture was developed, the problem of wealth sources was observed in physiocrats' studies. For them, a source of wealth was land. W. Petty accepted labor as a source of wealth together with land [13].

The next stage of wealth development appeared in the industrial society (from the Industrial Revolution in the 18th century to the latter half of the 20th century). Economic relations between a manufacturer and the society were declared by means of money there. The industrial economy is characterized as *mass*. Firstly, its goal is the mass goods and service production. Secondly, the main objects of production are substances and energy. A. Smith and D. Ricardo gave a theoretical estimation of such kind of economy.

In the developed industrial society in the epoch of Keynes and Erhard, a chief increase in the rate of surplus value provoked a mass demand for millions of family farms (*the economy of demand*). The conditions for a personal mental and creative development (human capital assets as a producer of new information) have been established since the end of the 1950's. A united IT platform/software application to use working hours and free time was being established based on new technologies. It serves the basic permanent personal intelligent development and generation of new money.

A third stage of wealth development have been formed in the information society in 1960–2020 which is the period of IT revolution. There is an advanced level of a personal mental and creative development (human capital assets). An intelligent and creative person represents the basis of a new wealth type. The final result of individual informational activity is information, goods, services, and scientific solutions. The authors believe it is necessary to interpret *the commodity form of a product of labor*, which is the imperative of the information commodity economy. In that society, money will reflect the economic relations between commodity producers and the world market in general. The ability to get the most reliable online information about markets and production facilities in any space contributes to the development of an international added value network. The concept of *information economy* covers all aspects related to software, computers, mobile communications and information data transfer. In the authors' point of view, the concept of a digital, network and virtual economy, an economy of knowledge, innovation, etc. is closely linked to the concept of *information economy*. An important part of information

economy is increasing productivity through information technology progress in the field of processing and data transfer based on the Internet and means of mobile communications. In this case, there are two main effects. These are wealth growth and significant productivity progress not only in the key, but also in other sectors of the economy.

It should be noted that man is a social being. It means people are able to communicate. Communication is an exchange of information resources among individuals, tribes, families, nations, and it is considered to be the main feature of human society. The means of communication also developed along with the social development. S. V. Klimenko and V. M. Yurovitsky argue that in fact, money is a universal interface connecting a person to a person, a company, a state, one enterprise to another (or others), an enterprise to a state, one state to another (or others) [14]. The initial form of market relations between a producer and a consumer is a direct exchange of goods. Economic subjects are integrated into macroeconomic relations by means of money. Money is considered to be an economic means of communication between economic subjects within the economic system. The economy is in a dynamic balance due to the effective exchange mainly. This property ensures economic protection, integrity and stability. An important medium of exchange is money. It is a universally recognized universal equivalent of cost of goods and services produced. In such a context, the benefit being exchanged becomes a commodity. Then, a particular special product preferred by everyone becomes money, which is a *transformed commodity form* [15]. However, it is reasonable to admit that goods as a result of people's practical energy are used as certain (personified or materialized/embodied) information. All goods are presented as information devices for storing. According to Y.V. Kuznetsov, the growth of a cognitive component in basic goods cost will lead to the cognitization of goods, turning them into a kind of *knowledge concentration* [16]. They can be definitely compared to each other by one common basis. Notice that costs of production are presented in money coded information. They can have a quantitative expression in certain units. The universal equivalence is based on the balance of socially necessary costs, reflected in information. As the authors argue, the symmetry property is reflected in money, in characteristics of its elementary functions and their interaction. Money performing a measure function of cost is regular both in their basic structure and the functional content. Simultaneously, it meets the principles of harmony, order, homogeneity, proportionality. As it was pointed out above that it is information, its cumulation is money which is a constituting factor. It is important to state that money as a measure of produced goods cost equates their value to a certain amount of information. By its content, money is an effectively arranged system of signals, the signs of which provide the opportunity to exchange various goods. Money performs it perfectly as mentally visualized money. Concerning this issue, the researchers note that *in the last decade of the 20th century money turned into a virtual tool for many clients of financial institutions long ago* [17]. The money that people use in everyday life is a united system of interdependent and interacting characteristics. They have an aspect that ensures the commonality of sold and purchased goods and services, their identity. The aspect observed by the authors is characterized by the notion of *universal equivalence*.

The authors conclude that money is a special information product (resource). It is also a universal equivalent for determining the cost of goods produced. Money is a *transformed form of the goods*, i.e. information (information resources). However, it contains extremely brief information about the product. In addition, a quantity of such information resources including a plain product and a complicated one is constantly growing. So they begin to accumulate in money.

Present-day theoretical approaches to the concept of *information* have led some researchers to the definition of money as an information product [18, 19]. The information theory of money derives primarily from its informative origin [20, 21]. According to T. Stonier, it is necessary to quantify the impact of information on economic life and define that most important feature in financial categories [22]. Nevertheless, many researchers propose to avoid perception of money as a material cost component. They insist that money in a contemporary society becomes independent of its form, in which they are turned out, but still having information only. In the researchers' opinion, the point of modern money is the information it owns. Today, money is not only a medium of exchange, but also an information channel that allows a consumer to compare unmatched aspects [23].

Information of a new society appears for a necessary modality of consciousness. It marks active, creative, and intelligent humans possessing the cognitive abilities. The authors suppose that the foundation of system-based interactions and relationships among people in a particular society is information resources. In this respect, the methodological principle of cohesion of actions and consciousness makes the authors treat economic activity as information activity on the one hand, and as the subjects' practical energy on the other hand. In this case, the authors claim that economic activity is an information activity, first of all. It is important to note that such key economic categories as cost, profit, money, price, per cent, and rent have a consistent subject, which is performed as their common information component. Above all things, the categories are the result of a reasonable and efficient economic policy. The internal maintenance of it is information activity and information itself. It means that the source of wealth is sort of information.

The development of digital technologies has become one of the main factors that influence the key process of the innovating reform of the economy and money supplies. This is the stage where the informational and technological infrastructure is moved to a more advanced analytical level. Support services structure electronic money as a digital format of content. In the meantime, money is transformed into an inseparable component of modern economy. History tells us that money have had a very relevant infrastructure within each model of the social development. The infrastructure ensures monetary persistent transmission. The availability and functioning of such an infrastructure provides a stable internal structure making sense of the monetary economy as a consolidated functioning tool. The Internet content is a route for mobile digital money distribution. It should be mentioned that relying on the

developing infrastructure and digital revolution, Internet content extends boundaries of global cyberspace of electronic/cyber money and becomes a more self-sufficient and economically significant factor. The essential growth of the wealth amount, the economy-wide capital flow improvement and the role of institutional investors who manage huge supply of money, have contributed to the establishment of a global system of finance. This system involves powerful constant fluctuations. The reviewed system is expansive by nature and has diffusion, which is constantly increasing. It covers not only all national economies, but involves millions of subjects, investors, financial operators, commodity producers, consumers and individuals.

The issue of interaction in the banking industry facing very complicated financial processes, as the authors treat it, can be resolved using a new, modern IT platform. Millions of financial transactions are presented as separate communication processes. In modern times, the banking industry is becoming an integral part of global cyberspace. Although, the first global information and communication system of interbank telecommunications *The Society for Worldwide Interbank Financial Telecommunications* (SWIFT) became the best model for integration of computer technologies and the banking industry [24, 25]. The presence of SWIFT indicates that financial information is becoming a common information product.

Dynamic diffusion of electronic forms of exchange modifies financial instruments and mechanisms serving online transactions. The fundamentals of the banking industry and the monetary system are also modified. Electronization removes a significant portion of cash from circulation. The global change to cashless funds transfer can reduce the costs of monetary supply currency greatly.

There are also significant changes in the payment system within the available Internet content capacity. There are two types of current online payments:

1) e-commerce payment systems that are used for plastic cards;

2) e-commerce payment systems that are used for electronic/digital currency.

Electronic money has recorded in recent decades. This term means the funds on computer accounts in virtual banks used in global network payment systems. But the usual functions of money are preserved generally, while they are still partially transformed. They intensify and optimize the current system of money transfer. International best practice proves that all functions of money are integrated by information resources.

The standard of value (*accounting money*) is measured by the amount of costs that are embodied in the product in generally accepted monetary units (number of currency). Money performs this function of *ideal money* completely. *Ideal money* requires a large quantity and complex calculations that the transition to digital technology has become business needs for modern industries.

Digital money performs the function of circulation quite well. It speeds up and simplifies the current system of payments much. In addition, a lag in the commodity flow, which is implied by the mechanism of commodity circulation, is reduced. Electronic money as a means of universal exchange of regular and intelligent goods and services makes transactions from one banking account to another as an electronic transfer. Thus, it covers huge transactional and production costs. Money is meant to be a decision-making tool in this case. This function is performed in electronic form after thousands of people have learned to use electronic cards.

As the global information infrastructure is transformed, digital money partly begins to perform the function of money as wealth savings. This function of money is performed fully in the form of repayment of transformational expenses. The expenses constitute the consumer wealth of families and individuals. In the new economic conditions, *transformational money* is breaking new ground, thereby being in advance of *accounting money* and *transactional money*. In the digital economy coordinates, the monetary system is modified intensively [26]. In general, there is a transformation of the global financial system taking place nowadays.

Global electronic money performs the function of a universal equivalent among the countries all over the world. However, it should be convertible into national currencies easily. In World money in a global world is modified as well. Global electronic money is a product of digital revolution and a factor of the digital economy developing.

In modern best practice, there are various patterns of electronic (digital) financial supply functioning. An *electronic wallet/a digital purse* ("DigiCash") has been developed through the efforts of many countries around the world. It is used in the open system of financial payments. There is a specific variety of *e-wallets*:

1) chargeable cards without specifying a nominal value;

2) non-chargeable cards with different nominal values;

3) *an e-purse* function complemented by a definite payment card.

The most widely used electronic payment patterns are being recorded. They are influenced mainly by innovative information technologies. It is necessary to distinguish the main electronic payment patterns as alternative ones:

a) Using smart cards offline (Mondex pattern);

b) A combined option for sharing smart cards and online payments through IT using electronic cards (Unisource and Milicent systems);

c) Using online payments only via computers, interactive television, public terminals (cash machines) and mobile phones [27].

IV. Conclusion

To sum up, the review of the main stages of the money history explains that the expansive intervention of electronic money changes the macroeconomic velocity of monetary supply currency and the *effect size* of the banking multiplier. Electronic money helps to increase the fund circulation

intensity. This owes the fact that its economy-wide operation simplifies, creates a base for punctual and permanent payment process with no intermediate participants and minimizes transaction costs.

As a result, electronic money is replacing cash circulation gradually, and is supposed to become a substitute for bank deposits over the long term. The authors believe that all this will depend on the adaptation rate of the monetary system in terms of adoption and use of digital money. Then, there will not be a major change in the value of the banking multiplier influenced by electronic money supplies. The seigniorage earnings/profit of the Central Bank of the Russian Federation will decrease because of the frontal support of electronic money. However, the Central Bank will get a real opportunity to charge for licensing the electronic money issue/monetization and to deal with its own electronic currency issuance. Nevertheless, in the authors' opinion, reserve requirements will most likely take the form of private or electronic money of the Central Bank of the Russian Federation.

So, nowadays the matter of administer is becoming more urgent in the society. It is affected primarily by the fact that electronic money lets banks not mediate in the lending capital market in favor of immediate direct monetary issuance quicker. And it is becoming more difficult to monitor such transactions. Actual problems include international standards, an effective defense system, an expansion of boundaries when using electronic (digital) in payment forms, looking for efficient and reliable patterns. This seems to require the development of new management and technological tools for monitoring and control by the government institutions.

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