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Electronic money as a new form of modern economy.

Горовой Валерий Андреевич

Студент

Финансовый университет при Правительстве РФ, Международный Финансовый факультет, Москва, Россия

E-mail: valeriy.gorovoy@gmail.com

Научный руководитель

к. э. н. Скалкин Владимир Владимирович

The paper studies the issue of electronic money.

Electronic money systems can be either card-based, using smart cards, or software-based systems, sometimes referred to as cyber payment systems. The terms “stored-value card” and “smart card” are often used interchangeably, although there are some technical differences between the two. Smart card functions as identification, library card, copy card, meal and parking pass. Both cards can be either a single or multi-purpose card with chip-based technology. These cards can function in either a closed system or open system. In addition to the card-based systems of electronic money, the world of electronic commerce has opened up a whole new market for making payments over an open system like the Internet. Software-based electronic money is now a preferred method for these payments.

The subject of the present study is e-money.

The objectives of the study are essence, history and instruments of e-money, its implementation, regulation, challenges and perspectives in Russian.

The tasks of the study are:

viewing the nature of e-money,

classifying the e-money instruments,

studying the history of e-money and e-economy,

considering types of e-systems used in Russia,

following innovations in Russian e-money legal regulation,

considering solutions for challenges of applying e-money in Russia,

forecasting the future development of e-payment in Russia.

The electronic commerce market is predicted to grow rapidly. One reason for this is the proliferation of personal computers. Although you do not need a PC to access the Internet, that is the way most users are accessing the Internet today. Web TVs were introduced in late 1996, and other access technologies may be developed, but PCs remain the primary access device. The extensive adoption of consumer info communication technologies such as mobile telephony and social media, the enlarged recognition of online activities such as e-banking, online shopping and content sharing have driven the development of the new eras of digital economy. The rise of digital economy is powered by the development of the Internet technologies and new tendencies in the consumer behavior that are transforming government and businesses visions and activities. Today, it is still not clear whether there will be a large demand for the electronic purse concept in the real world, but there appears to be little doubt that an additional payment method is needed in the virtual world. And

an electronic purse that could be used in both worlds seems to have substantial potential. This speaks for the topicality of the paper's theme.

Considering the advantages of electronic money, it can be more convenient to identify ones personality, it can also be more secure (or may not, depending on the system), besides it solves the problem of "exact change".

In developed countries e-money is displacing physical money. In the USA, for example, just a small part of the currency circulates in physical form. The need for physical currency has been declining since more and more people start using electronic alternatives to traditional currency. Nowadays more and more employees receive their paychecks through direct deposit, move money with electronic fund transfers, and spend money with credit and debit cards. While physical currency still has advantages in certain situations, its role has gradually diminished.

Electronic money: Elements of definition

Electronic money is money which exists only in banking computer systems and is not held in any physical form. It is stored in electrical form on a smart card and used when buying things in a shop.

Electronic money is also referred to as money stored in electronic form on a virtual (Internet) account, used to buy things on the Internet without using a smart card.

In other words, electronic money is a monetary value stored on an electronic device or stored on-distance in a central accounting record.

At that, n electronic money institution is defined as a party whose business it is to obtain funds in exchange for which electronic money is issued with which payments can be made, also to parties other than the party issuing the electronic money.

Another definition of electronic money, or e-money, is any electronic payment media — any material, device, or system that conducts payment via the transfer of electromagnetically stored information.

E-money may be "currency" in that it can be stored in a physical "wallet" like a smart card or token, but it generally exists as account data on some electronic storage device. Credit cards fit under this definition of e-money. Banks already create e-money as part of their normal lending process, when they issue loans by crediting the deposit accounts of the borrowers (or the receiver of the loan proceeds). In fact, paper cheques have become e-money thanks to truncation.

Electronic currency or electronic cash is an inaccurate name and possibly a contradiction in terms. The term usually refers not to the money itself, but to a portable storage device for e-money that can be carried like cash and used in place of cash. An example is the stored value card. The storage device does not circulate, since the holder of the card retains the device after the transaction. A better term is electronic purse. Electronic purses, moreover, are not necessary for an electronic currency replacement. Physical electronic purses, which can be lost, stolen, or damaged, can be replaced by electronic money systems that use biometric identification, such as thumbprints or retina images, to enable individuals to access their e-money balances remotely.

Rise of digital economy

The widespread adoption of consumer infocom technologies such as social media and mobile telephony, coupled with the increased acceptance of online activities like online shopping, e-banking and content sharing have led to the emergence of the New Digital

Economy. These driving forces are powered by the Internet and driven by consumer trends that will transform businesses and government processes and responses, in turn leading to new wealth creation around the world.

There is no authoritative definition for the Digital Economy although the term has been in use since the 1990s. Most definitions of the Digital Economy will expand beyond just the Internet Economy (economic value derived from the Internet) to include economic and social activities resulting from other information and communications technologies (ICT). For example, the Australian government defined the Digital Economy as “the global network of economic and social activities that are enabled by platforms such as the Internet, mobile and sensor networks”.

According to David Reed, an adjunct professor at the MIT Media Labs credited for his involvement in the early development of core Internet protocols, the Internet consists of three conceptual "clouds": the connectivity cloud - for the transfer of information, the resource cloud - for the storage of data, and the social cloud - for networking and collaboration. These clouds, which can be public, private or semi-private, provide the infrastructure for the growth of the New Digital Economy. They enable the creation of new markets and provide the conduit for the movement of resources and demand. As a result, firms and individuals worldwide can participate in innovation, wealth creation and social interaction in ways never before possible.

Access to the Internet is the driving force behind the digital economy. It increases the speed with which information is produced (instantaneously), transmitted (immediately), shared (collaboratively) and acted upon (spontaneously). According to Internet World Stats, an estimated 2.2 billion (nearly 33%) of the world population used the Internet as of end 2012. This number is expected to continue growing in the next few years. Not surprisingly, the biggest spike will be in Asia which will account for more than half of the world's Internet users by 2015.

A digital economy is a convergence of communications, computing, and information. The essential in the new (digital) economy is a structural shift from the industrial economy toward an economy characterized by information, intangibles and services and a parallel change toward new work organizations and institutional forms.

The focus of the new economy moves from processing material input into material output toward creation, trading and distribution of knowledge, intellectual property and intangibles. The symbiosis between changing production and business processes and information and communication technologies (ICT) is the driving force toward the new, digital economy

The essential elements of the digital economy are:

digitalization and intensive use of information and communication technologies (ICT),
codification of knowledge,

transformation of information into commodities; and new ways of organizing work and production.

This implies that much of information and many services are available online (Kehal and Singh, 2008: 3-4).

Development of electronic money

In a sense, digital cash has been around for years in the form of the automated clearinghouse (ACH), automated teller machines (ATMs), point-of-sale debit cards, and credit card networks. Even coded subway and phone cards function as a type of electronic cash.

Thus, Diners Club issued the first credit card in 1950. At first, credit cards were considered a special perk available mostly to rich businessmen. As soon as banks realized there were billions of dollars to be made by issuing credit to as many people as possible, credit cards exploded. Today's largest credit card company, Visa, started out as the Bank of America, and issued the BankAmericard in 1958.

Next, the Social Security Administration first offered automatic electronic deposit of money into bank accounts in 1975. Once people became comfortable with the concept of money being added to their accounts without ever holding the cash, the practice spread. People started paying bills, transferring money between accounts, and sending money electronically.

So, the roots of electronic money can be found in the increased use of computers. In 1860, the Western Union introduced the electronic fund transfer (EFT) and this marked the beginning of electronic money.

In the 1960s when IBM and American Airlines created a system called SABRE (Semi-Automatic Business Research Environment), this allowed offices of American Airlines fitted with terminals connected to telephone lines and helped agencies to check flight times, seat availability, and then make reservations electronically that could be paid by using a system of credits.

By the 1970s, Banks in America and Europe has started using mainframe computers, it helped them track transactions. It was a system that proved to be a success internationally when currency exchange was needed.

Consumer uptake of electronic money was first noticed in France in 1982 with the introduction of the Minitel service. The French Minitel service used a dumb terminal with built-in modem, the service operated over standard telephone lines and the terminals were equipped with full AZERTY keyboards. The subscribers typed messages or searched queries. These Minitel terminals were given for free to more than 9 million households to encourage business entrepreneurs. Payment could be made through credit card or charged to the telephone account. This marked the first use of electronic money in the consumer market.

In 1979, a slightly similar service was launched in the UK named Prestel. It supported equipment was costly and it required customers to call and arrange payment over the phone. A service known as Homelink started in 1983 with the support of the Bank of Scotland and Nottingham Building Society. The account holders could subscribe to a special Prestel service that allowed online banking. This marked the first recorded use of electronic money.

The year 1991 saw the introduction of internet in consumer market and the disbanding of the Arpanet network. It wasn't long until 1992 when America Online took advantage of the new Internet and started offering retail services directly to their subscribers who could pay using a credit card.

PayPal was formed in 1998. The innovation of PayPal was to offer virtual account to the customers that could be topped up using credit card or wire transfer. Then email addresses were used to receive and send money. The services of PayPal marked a unique beginning of electronic money which was different from traditional phone and online credit card transactions

Private currencies had also proliferated encouraged by the demand for some form or marketplace within networked games like World of Warcraft and Second Life. Since then, private currencies have developed in many forums and webmaster services as a means of offering advertising amongst members.

In late 1990s, the technologies related to electronic money like electronic checks and embedded smart cards used the public key cryptography for transferring money. With the advent of e-mail, the transactions of electronic money started increasing. People started sending their credit card details via e-mail to buy goods. Later, the customers started having an online account to avoid transaction fees.

Nowadays, the use of electronic money is possible due to cryptography and digital signatures. Public key encryption and decryption together are called public key cryptography. The public key encryption involves two keys, viz. public key and private key to authenticate the identity of an entity, electronically. As the name suggests, the public key is published and the private key is kept secret. Data is encrypted with the public key and the same data is decrypted with the corresponding private. Digital signatures are used when you are encrypting some important information that is to be kept confidential. Digital signatures involve the use of hash tables that encrypt a hash using the private key and decrypts the hash using the private key.

This technique changed the tangible cash to electronic cash and is hassle free. Two types of electronic cash are direct deposit and electronic fund transfer (EFT). The debit cards and online payment of bill, help in easy and quick transfer of money. However, there are a few disadvantages of electronic money. Frauds and system failures are the significant drawbacks of electronic cash. The hacking of personal banking accounts are observed frequently in these years. Failure of software and power loss can sometime prove dangerous when transferring money electronically.

Electronic money instruments

The most popular classification of electronic money instruments, presented in the literature, distinguishes two types of these instruments:

card based instrument – reloadable prepaid card used to make payments;

network money instrument (software based instrument) – named files, generated and managed by dedicated software installed on holder's computer device, storing electronic money in their memory.

However, the classification presented above do not exhaust all aspects of e-money instruments. For instance, Gormez and Budd (2010) consider electronic money instruments in terms of form and electronic money storage place. They define following types of these instruments:

account based instruments – debit and credit card instruments with all transactions to be recorded and authorized centrally by e-money issuer;

token based instrument – a number with specific mathematical properties, which is generated by use of cryptographic techniques– circulates through telecommunication networks or is exchanged by direct connection of electronic devices (e.g., smart cards and card readers).

Other aspects of distinguishing electronic money instruments are presented by Bamodu. The author distinguishes two dimensions of these instruments. The first dimension is user anonymity, and the second is the necessity of having active network connection in order to use e-money instrument. In terms of anonymity following types of electronic money instruments may be defined:

identified e-money instruments – an identity of a payee and a payer is revealed during payment transaction; moreover, an issuer of e-money is able to track the payments as in case of debit or credit card payment;

anonymous e-money instruments – an identity of a payee is not revealed during transaction

and no one is able to link a payee with a payer;

semi-anonymous instruments – a semi-anonymous electronic transaction can be tracked if required by law; at that, only trusted institutions know (or may obtain information about) payee identity and transaction details.

The second dimension of electronic money instruments mentioned by Bamodu – the requirement of having active connection to the network – allows to classify e-money instruments as:

on-line instruments – a connection with electronic money issuer is indispensable to complete the payment;

off-line instruments – a transaction between a payer and a payee can be completed without any additional connection with a third party

The amount of payment is the last aspect of electronic money instruments classification. Instruments distinguished with accordance to this aspect fall into three categories:

picopayment instruments – payments that amount less than one cent to one Euro can be handled;

micropayment instruments – payments of amount between one Euro and ten Euro are supported;

macropayment instruments – transactions of large amounts are processed.

The legal definition of electronic money instrument influences significantly the architecture of electronic money system. Until adoption of Directive 2007/64/EC, electronic money instrument was defined by Commission Recommendation of 30 July 1997 concerning transactions by electronic payment instruments and in particular the relationship between issuer and holder. According to the recommendation, electronic money instrument had to be reloadable. This requirement prevented including gift cards into electronic money instruments. Moreover the monetary value (electronic money) needed to be electronically stored on the electronic money instrument. That approach hampered development of account-based systems. Unfortunately Commission restricted types of electronic money instruments to stored-value cards and computer memory, allowing only the card based and software based systems to operate.

The computer age has made the emergence of e-money possible.

The rise of digital economy has been driven by developments in mobile telephony, social media, online shopping, e-banking and content sharing. So the digital economy can be defined as a combination of information and communication technologies and services.

Tracing the history of e-money, the first credit card was issued by Diners Club in 1950. Next, automatic electronic deposit of money into bank accounts was offered by the Social Security Administration in 1975. Then, the electronic fund transfer was introduced by the Western Union in 1860. Later, SABRE (Semi-Automatic Business Research Environment) was created by IBM and American Airlines in the 1960s. By the 1970s, mainframe computers started to be used by Banks of America and Europe. In 1979, the introduction of the Prestel service in the UK, and in 1982, the Minitel service in France enabled consumers use electronic money. In 1991 the internet in consumer market was introduced and Arpanet network was disbanded. By 1992 America Online also started implementing the Internet payments through a credit card. In 1998 PayPal service offering customers virtual account was introduced. In late 1990s, the electronic money technologies such as embedded smart cards and electronic checks started to imply the public key cryptography to perform money transfers. With the development of e-mail, the electronic money transactions became grow in

use. Consumers started sending details of their credit cards through e-mail to buy products and services. Later, there was an introduction of online accounts for customers to avoid transaction costs.

Today, there are two types of electronic cash – electronic fund transfer (EFT) and direct deposit. Debit cards and online bill payment becomes more and more popular. There is a wide use of electronic money through cryptography and digital signatures.

Considering e-money instruments, generally they are divided into: card based and network instruments. Next, in terms of form and electronic money storage place, there are: account based and token based instruments. Then, in terms of anonymity e-money instruments are divided into: identified, anonymous and semi-anonymous instruments. Later, according to the necessity of having active network connection in order to use e-money instrument, the instruments are: on-line and off-line. And finally, with regard to the amount of payment there are: micropayment, micropayment and macropayment instruments.

As to national Russian e-money payment systems, they are: WebMoney, Yandex.Money, QIWI and i-Free. The first three systems allow exchange electronic money for another digital currency of their own or other digital money systems. They also allow deposit e-money account and convert e-money into cash. While i-Free provides the services of mobile payment, mobile vending and telemetering.

Concerning legal regulation of e-money and payments in Russia, the NPS Legislation introduced monopoly for credit institutions on the issuance and transfer of electronic money. Next, NPS divided electronic means of payment into personalized and non-personalized ones to minimize the risks of electronic payments being used for money laundering, and to develop and diversify the types of prepaid products. One more important point is the direct recognition of the use of e-money and electronic means of payment by legal entities to make it possible to introduce corporate plastic cards, as well as non-bank-account-based payroll cards. And last significant innovation introduced by NPS is mobile payments.

Concerning challenges of e-money for monetary policy, there is a need to: safeguard the role of money as the unit of account; raise effectiveness of monetary policy instruments; lessen repercussions of electronic money on the information content of monetary indicator variables. To meet the challenge the ECB proposes extensive regulation of issuers of electronic money and electronic money schemes.

Considering security challenges, e-money increases the following main security risks: fraud, theft of financial or commercially sensitive information (criminal breaches); defacement of web sites or denial of service, causing web sites to crash (breaches by casual hackers); and genuine users seeing, transact the information on other users' accounts (flaws in systems design and/or set up).

To avoid the breaches objectives for e-money security arrangements are: system access restriction; the identity authentication; maintaining the information secrecy and accuracy in the process of its passing over the communications network; unauthorized access prevention.

Among security features available to protect e-money products are encryption, electronic signatures, and Trusted Third Parties (TTPs).

With regard to the future of e-money in Russia, its use is becoming more and more popular in Russia. Thus, in 2010, the market size of e-money in Russia was valued at RUB 70bln. While, according to Step by Step researches, further growth of the Russian electronic payment services market is forecasted to rise to RUB 323bln by 2015.

The reasons for this tendency are: advantages of online and offline e-money compared to cash and a legal control of electronic money storage and transactions inspiring greater confidence in e-money, making it harder to laundry and attracting new clients and, therefore, more investment.

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