

DIGITAL INNOVATIONS IN THE WORLD OF FINANCE

Abstract: In recent years, digital innovations in finance have attracted strong influence from public authorities and financial sector participants because of their promise to reduce or completely eliminate inefficiencies in retail payments performance, including those related to remote consumer transactions. Technological innovations also present challenges and some of them are of a legal nature.

With technological innovations that are still in the formative phase, it is essential to identify and evaluate those challenges in order to better understand which of their applications encourage and mitigate the risk of technological innovations that destabilize the efficiency and security of payments.

The purpose of this topic is to analyze the economic aspects of the economy and identify the factors that could hinder its growth. Existing literature on e-money development is limited. Some other contributors explain the problem faced by the evolution of e-money on the demand side. They argue that the use of electronic payment systems requires many preconditions, such as the relatively high level of income and education, which are not necessary for the use of other payment instruments.

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1. Introduction

The last decade of the 20th century was an economically prosperous decade, highlighted with significant advances in technological innovation and adaptations and their application in all socio-economic activities. Some observers argue that it is moving toward a new economic era - a knowledge-based economy or a digital economy-which could lead to a third industrial revolution similar to the one first represented by the development of spinning machines and steam engine in the late 18s, and the latter characterized by the development of electricity and railways in the late 19th century. The last decade of the 20th century has also been marked by rapidly reducing costs and improvements in the operation of computers and telecommunications. As a result, the computer becomes omnipresent: most offices use computers to manage their internal and external activities, and more and more households become connected to the Internet and other networks. This development spurred commercial activity through the Internet and enabled the exchange of a wide variety of funds electronically. It has also led to the development of some new forms of funding. The new form of "money" that received the most attention around the world is called "e-money products".

This term refers to pre-payment systems in the real and virtual world, which aim to increase the efficiency of existing payment systems and to replace money and coins in retail transactions.

2. Adoption of monetary innovation - e-money

In fact, There is no universal definition of e-money. The Bank for International Affairs confirms that electronic money is difficult to define because it combines specific technological and economic features. In addition, various e-money schemes have been developed and significantly differ in their characteristics, their technical implementation and the way in which the value is transferred. As a result, several definitions of electronic money evolved over time. In 1998, the ECB defined electronic money as "an electronic store with a monetary value of a technical device that can be widely used for paying non-issuing companies, without the necessary involvement of bank accounts in the transaction, but acting as a prepaid carry-on instrument".¹

Despite the great interest in the world in e-money, the adoption of this monetary innovation is still at its primary stage. So far, it is not widespread in the European Union or in other industrial countries. The money remains a dominant paid asset, especially in retail merchandising and everyday retail transactions.

The purpose of this topic is to analyze the economic aspects of the economy and identify the factors that could hinder its growth. Existing literature on e-money development is limited. Some other contributors explain the problem faced by the evolution of e-money on the demand side.² They argue that the use of electronic payment systems requires many preconditions, such as the relatively high level of income and education, which are not necessary for the use of other payment instruments.³

The main contribution is to establish that the adoption and use of electronic money products also depends on two other factors. The first factor is the network externalities and the two-sided (adoption and use) nature of the market for the use of electronic money. The second is the "problem with a habit", a psychological factor associated with the so-called pathway of dependence on the development and use of electronic money.

3. ICT revolution and innovation of money

Electronic money is not a new phenomenon. Since the revolution in information and computing technology (ICT) in the mid-1990s, the decline in computer and semiconductor costs and the growth of internationally connected computer networks, the majority of payments have become electronically. Online trade increases the use of these new technologies and consequently increases the demand for a new electronic payment system.

However, the electronic transfer of payments in retail financial transactions and the use of the Internet as a monetary market are relatively new. As a result, the geography of money has changed. Due to the ICT revolution, a new form of electronic payment appeared and quickly gained considerable attention around the world, and we are talking about electronic money products (also known as electronic money, e-money, e-currency, digital currency, digital money, penalty or digital cash). The money contains information stored in a microcomputer or in a computer database that provides data, including account balances, personal information, PIN codes, shopping information, and loyalty awards that need to be stored on the card. The goal is undoubtedly to improve, and to improve the efficiency of traditional payment systems.

The volume of e-commerce has grown steadily in recent years, with an increasing number of consumers buying goods and services online. While electronic commerce drastically changed the way consumers communicate with retailers, however, it was not like the radical impact on genuine payment

¹ ECB, 1998.

² Stavins, J., 2001. "Effect of consumer characteristics on the use of payment instruments". *New England Economic Review*, 20-31.

³ Cohen, B. J., 2004. *The future of Money*, chapter seven. Princeton: Princeton University Press.

instruments or channels for the final settlement of low-value commercial transactions: they continue to be resolved mainly through conventional means and, especially through bank transfers - direct debit and debit or credit cards.

The technology-enabled financial payments keep the promise to transform the processing and settlement of retail payments in at least three different ways. The first is through a potential replacement of traditional currency funds with virtual currencies, such as bitcoin. The second is monitoring the processing of payments through decentralized real-time platforms without the involvement of trusted third-party intermediaries. And the third way is by automating the execution and settlement of payment transactions by collecting the smart deals on digital platforms.

4. Digital cash

Digital cash define any electronic monetary value store used for electronic payment of entities other than the digital publisher itself, principally without the involvement of a bank or other intermediary as a settlement agent. Depending on the technology used to store the monetary value, digital cash will be hardware or software. Prepaid payment cards are a typical example of hardware digital cash. Digital cash-based of hardware is essentially a digital representation and a reliable value transfer mechanism with a technical device in which the value electronically stored serves as a pre-paid instrument holder. Hardware based hardware has many advantages. Namely, they are safe, can be used for out-of-time payments, and their use leaves a complete trail to all online transactions enabling e-money users to retain their actions and at the same time to preserve their anonymity.⁴

However, electronic money has a number of shortcomings. Digital cash is more difficult to recover from physical money that is transmitted through conventional payment channels. More importantly, issuing electronic money for foreign customers and their inconsistent use as a means of payment for cross-border transactions can cause regular and legal concerns as an activity for issuing digital money regulated in many jurisdictions.

5. Barriers that hamper the development of e-money

When the e-money product was first introduced, it was proclaimed money for the 21st century due to its peculiarities and advantages for consumers, retailers and financial institutions. However, the e-money product is still in the primary stage. According to the Blue Book of the European Union, prepaid card payments represent only 0.7% of the total amount of money used in the euro era.⁵ This new money innovation is not widely used in the European Union nor in other industrial countries. The money continues to be used as the most important single payment method for most retail retail transactions. Beyond the two reasons cited at the top of the paper (the supply side and the mandate), we argue that the use of electronic money products depends on two other factors that explain their slow adoption. The first is network outsourcing and the two-sided market, and the second is a psychological factor.

5.1. Network externalities

According to Shmalense, the network can be defined as a set of nodes that are connected, directly or indirectly with a set of connections. Shmalense claims that the main feature of the network is the presence of network externalities. This concept is abundantly used in economic literature; it is also of constant interest for an industrial organization and a public economy.⁶ The term "network externality" refers to the phenomenon that makes the service more valuable as more people use it, which encourages a steady increase in the number of adopters. This is also known as increasing the return of the scale and a positive spiral. This effect is common in digital products, in particular products that benefit from

4 Lo, Stephanie and Christina J. Wang, 'Bitcoin as Money? Current Policy Perspectives', *Federal Reserve Bank of Boston*, September 2014.

5 European Central Bank, 1998. *Report on electronic money*. Bucharest: European Central Bank.

6 Katz, M. L. and Shapiro, C., 1986. "Technology Adoption in the Presence of Network Externalities". *Journal of Political Economy*, 94, 822-841.

connecting the customer base. Telephones, fax machines and computer operating systems are examples. Its success is due to compatibility issues and conformity, not that the product or technology can be better or inferior to competition.

Farrell and Saloner provide early analysis of network externalities; they classified it into two groups: direct and indirect network externalities.⁷ Direct network externals exist when increasing the size of the network increases the number of others that can be "communicated" directly. In this type of network there is a kind of interaction and there are complementarity between users of the same product or service. Indirect network externalities exist when the size increase of the network extends the range of complementary products available to members of the network. External networks introduce dynamic thinking for users and for manufacturers.⁸ For users, the decision to adopt must consider the size of the network in the future to avoid being trapped in an unpopular network. The companies have incentives to invest in the construction of proprietary networks from which they can earn wages.

Markets that face network effects tend to become more effective as more people are joining a network (product market) rather than having a market with many proprietary networks (a competitive market). Once the network effects are established, markets tend to lower the peak, favoring the market leader at the expense of other products on the market.

5.2. Anticipation of "critical mass"

Electronic money cards, like other innovations that involve creation of a network between the manufacturer and the consumer, are a product that inevitably involves the network externality must touch the critical mass of the user before starting to use it successfully. The indicated phenomenon in literature is called a two-sided market. The development of the payment instrument first depends on two types of externalities associated with their application and use. The outsourcing of the network exists because the average consumer benefits from such an instrument, only if other consumers and traders use the same payment instrument. Additionally, the total benefit from the use of e-money card exceeds the usage limit realized by the individual consumer. By accessing one user to the network, the benefits for other users are increased. Thus, the user's critical mass will be achieved when the demand-side dependency between retailers and consumers will not be more economically significant, i.e when the expectations of the consumer benefit will not significantly change depending on the new members of the network.⁹ Consumer benefits will increase when more merchants accept the new payment instrument, while the commercial benefit will increase if consumers use the new instrument more often. Additionally, the attractiveness of such an instrument can be reduced due to the incompatibility and competitiveness of the composition, as in the case of video recorders a few decades ago.¹⁰

The use and distribution of the network is a complex issue because the interdependence of demand will remain an obstacle until the network reaches a critical mass, either independently or with the help of a regulator. According to the analyzes of Katza and Shapira the growth of the network in its nature can be self-fulfilling.¹¹ Accomplish a critical mass in using Blockchain is not easy because traders must invest in special POS devices to be able to use e-money; and consumers will have to use e-money in a retail transaction as a substitute for coins and paper money. The goal of this problem is to convince a large number of users to start using e-money.

One of the reasons that few people use this payment method is precisely the habit of using cash for a retail transaction. At the same time, the banks' habits in carrying out a transaction may be the reason

7 Farrell, J. and Saloner, G., 1985. "Standardization, Compatibility and Innovation".

RAND Journal of Economics (16), 70-83.

8 Klenow, J. P., 2002. *Evidence on Learning and Network Externalities in the Diffusion of Home Computers*.

Federal Reserve Bank of Minneapolis and NBER.

9 Osterberg, W. and Thomson, J., 1998. "Network Externalities: The Catch-22 of Retail Payment Innovations".

Economic Commentary, Federal Reserve Bank of Cleveland.

10 Stavins, J., 2001. "Effect of consumer characteristics on the use of payment instruments". *New England Economic Review*, 20-31.

11 Katz, M. L. and Shapiro, C., 1986. "Technology Adoption in the Presence of Network Externalities". *Journal of Political Economy*, 94, 822-841.

for the slow implementation of new insurances. Consumers gained confidence in financial intermediaries over time, and therefore did not get used to doing a transaction without their presence. Therefore, consumers are not ready for change. More consumers need more time to get to know the functioning of the new payment system. Accordingly, most of them would look forward to seeing the development of the situation because they want to gain more confidence before accepting innovation. As each phenomenon goes through stages of development, it is possible to expect further progress and an economy without cash using the digital economy.

6. Conclusion

The technology-enabled financial payments keep the promise to transform the processing and settlement of retail payments in at least three different ways. The first is through a potential replacement of traditional currency funds with virtual currencies, such as bitcoin. The second is monitoring the processing of payments through decentralized real-time platforms without the involvement of trusted third-party intermediaries. And the third way is by automating the execution and settlement of payment transactions by collecting the smart deals on digital platforms.

Due to the ICT revolution, a new form of electronic payment appeared and quickly gained considerable attention around the world, and we are talking about electronic money products (also known as electronic money, e-money, e-currency, digital currency, digital money, penalty or digital cash).

Banks play a key role in promoting online business. Despite that e-buyers have the opportunity for cash income, which seems to be reliable and trusted, there is still a need for e-payment schemes that can be provided only through banks. Banks act as strong and confidential mediators in online transactions and provide bold opening of online business. Currently, banks have electronic payment systems such as online banking, electronic fund transfer (NEFT / RTGS), plastic money (credit card and debit card) and mobile banking. These systems allow you to pay for on-line transactions, such as online product purchases, mobile additions, hotel reservations, reservations of tickets, etc. taking into account all types of safety measures. For the real one operation of these e-services, the need for appropriate infrastructures is inevitable characteristic. With a significant increase in the penetration of mobile phones, related to the potential public telephone system and the low cost of the mobile telephony, we can hope that M-banking will play a significant role in the pressure for financial inclusion.

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