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Macro determinants of operation of e-money systems in European Union

Introduction

Money since ages has been facilitating trade, by making transactions faster and more convenient. The forms of money have been developing from the commodity one, through metal and paper tokens, to a piece of information stored in the banking system. The process of money transformation has been caused by increasing requirements of economy, continuously and all-the-time unsatisfied. Also nowadays, the globalization of economy unfolds a challenge of new payment methods.

The main goal of this paper is to identify and evaluate macro-environmental factors determining the operation of electronic money systems. In addition, an identification of evolution trends of electronic money systems is discussed.

The macro-environmental factors were analyzed respecting political, legal, economic, social and technological aspects, according to PEST framework. These factors were identified by an analysis of official acts of European authorities, statistical data, literature references, and an analysis of state-of-the-art of nowadays technology.

The remainder of the text is organized as follows. The political and legal factors determining operation of e-money systems are identified in Section 1. Section 2 deals with economic and social aspects influencing e-money systems. Section 3 describes an impact of new technologies on e-money systems operation and anticipates the way these systems will evolve. Section 4 summarizes the paper.

1. Political and legal factors

During last decade, two factors emerged influencing the operation of electronic money systems in European Union. The first one is related with a regulation of the matter of electronic money by European authorities, and gradual liberalization of the operation of electronic money providers. The second one is linked with the standardization and unification of electronic payment systems in European Union by Single European Payment Area (SEPA) initiative.

European authorities, in order to foster the development of electronic money systems, adopted Directive 2000/46/EC. This legal act aimed to provide strong foundation for electronic money systems operation by: defining the concept of electronic money, specifying e-money issuers, and determining condi-

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tions of electronic money redemption. Moreover, Directive 2000/46/EC introduced new kind of an enterprise – electronic money institution (EMI). EMI is an enterprise that meets the requirements of the European law and has been authorized to issue electronic money. However, the regulations concerning EMIs were quite strict, as the range of business activities allowed to undertake by this institutions were limited. What is more, the structure of EMI's investments was limited as well [Directive 2000/46/EC].

In 2008, after an evaluation of the application of Directive 2000/46/EC, European Commission came to conclusion, that in the matter of fact this legal act “*have hindered the take-up of the electronic money market, hampering technological innovation*” [COM(2008)627]. The first factor hampering development of electronic money systems was related with unclear definition of electronic money and scope of directive, generating legal uncertainty among businesses. The second one was caused by an inconsistency with regulations introduced by the directive concerning the business of credit institutions and directive introducing customer due diligence, which aim to prevent money laundering and financing terrorism [COM(2008)627].

In order to tamper above-mentioned hindrances, European Commission decided to propose a project of a new directive, which is expected to “*enable new, innovative and secure electronic money services to be designed, provide market access to new players and foster real and effective competition between all market participants*” [COM(2008)627]. Having regard to the proposal of the European Commission, European Parliament has adopted Directive 2009/110/EC, which includes new regulations concerning the matter of electronic money. Three reasons, why the new directive contributes to the development of electronic money systems, may be distinguished. First, the definition of electronic money¹ was liberalized so as to cover the e-money stored both “*on a payment device in the electronic money holder's possession*” and “*remotely at a server and managed (...) through specific account for electronic money*” [Directive 2009/110/EC]. This liberalization liquidated legal uncertainty concerning the electronic money systems architectures, especially account-based ones. Second, the new definition of electronic money broadened the range of e-money acceptors by including natural persons besides the legal ones. This change should foster acceptance of electronic money, as it allows for e-money transfers between two natural people. Third, the Directive 2009/110/EC broadened the list of entities allowed to issue electronic money. Nowadays, besides credit and electronic money institutions, there are following entities entitled to issue electronic money: post office institutions, European Central Bank, national central banks and Member States' authorities [Directive 2009/110/EC]. An inclusion of central banks and Member States' authorities into the list of electronic money issuers may cause that these entities will contribute to the development of

¹ The definition of electronic money provided by Directive 2009/110/EC does not specify a place of e-money storage, in contrary to the definition included in Directive 2000/46/EC, which stated that e-money is “*stored on an electronic device*”.

Pan-European standards for e-money systems and broader adoption of e-money payment methods.

Directive 2005/60/EC on the prevention of the use of the financial system for the purpose of money laundering and terrorism financing influenced significantly anonymous electronic money systems as it prohibited credit and financial institutions from keeping anonymous accounts [Directive 2005/60/EC]. However, Directive 2005/60/EC included derogations from customer due diligence requirements if the maximum value of e-money stored on non-rechargeable device is no more than 250 EUR and on rechargeable device total amount transacted in a calendar year do not exceed 2500 EUR [Directive 2005/60/EC][Directive 2009/110/EC]. Limitation of stored amount caused that anonymous e-money systems may be applied only in the case of dealing with micropayments².

The political trend to create Single Euro Payment Area (SEPA) certainly influenced electronic money systems. European authorities have been striving to create global, harmonized payment market by legal initiatives such as adoption of Directive on payment services in the internal market [COM(2005) 603]. The electronic money systems may be affected by similar trends as in the case of funds transfer, e.g., a standardization of e-money infrastructure may be expected, which should increase the adoption of e-money by customers and merchant and decrease costs of e-money systems operation. However, the established standard does not have to be the most efficient and innovative one, as large financial enterprises may force adoption of their own solutions. Moreover, for the small electronic money providers, the cost of infrastructure change may become too severe to continue the operation.

2. Economic and social factors

As the economic and social factors affecting operation of e-money systems are inter-dependent, they are analyzed in one section. There are two areas for which e-money is applicable. The first area is related with micropayments in the Internet, while the second one – with everyday low value purchases in brick and mortar shops. In this section, first the factors influencing e-money systems operating in the Internet environment are presented. Then the use of e-money in face-to-face payments is described. Finally statistical trends, concerning e-money, are analyzed.

The appearance and growth of electronic economy is the significant factor stimulating development of new payment systems. On one hand, a customer in electronic economy wants to consume digital content immediately. On the other hand, merchants require payment confirmation before providing the content. That is the reason why on-line transactions require a suitable mean of payment allowing quick, safe and possibly anonymous purchases. Electronic money sys-

² Micropayments apply for low-value economic activities, which paid by a check or a credit card are not economically justified [Deshmukh, 2006, p. 178]

tems appears as a solution that meet the needs of on-line transactions. Electronic money systems may be quite cost-efficient, as they do not depend on any external, commercial infrastructure, in contrast to the case of electronic funds transfer.

As the operation of electronic money system is related with a development of electronic economy, it is deliberate to analyze social and economic factors influencing this economy.

The appearance of information society significantly affect electronic economy and electronic money. European Economic and Social Committee points that electronic money should develop “in parallel with the information society” and even become “*the money of information society*” [EESC 2009]. As the information society is characterized by the need “*to share payable knowledge as a part of an economic activity*” [Cellary 2007], there is a strong need for a market and appropriate means of payment to meet this need. Nowadays, the electronic content is provided mainly via a subscription (digital libraries) or at pre-paid basis (music stores) by commercial organizations. However, we are facing a new social phenomenon of “*people living from creating, selling and buying information, knowledge and wisdom*” [Cellary 2007]. This phenomenon requires digital content to be sold on pay-per-use basis, as the members of information society will use the content provided on different internet platforms by people living in different world regions. The price of digital content varies from about \$1 for a song in MP3 format to few hundred dollars for a computer program. As the payments of small value by debit or credit-card are not economical, there is a need for electronic money to support micropayments.

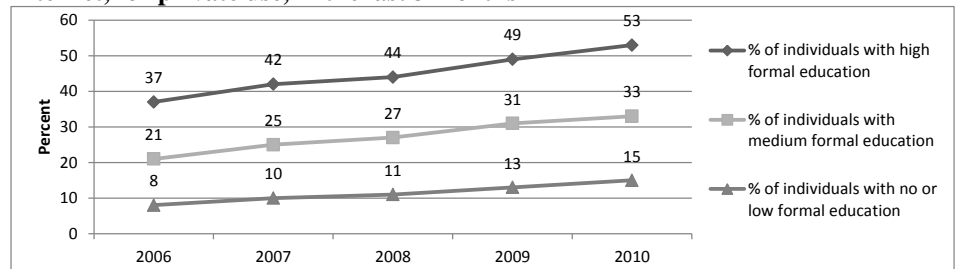
The level of education plays significant role in information society. People with higher education are the main producers and consumers of information. There is steady rise in the number of students in the European Union. Since 2000 this number has risen by over 3 million³. What is more, people with higher education are more keen to purchase over the internet and they adopt e-commerce faster than individuals with lower education (Figure 1). These trends are expected to make information society flourish and positively impact payment systems (Figure 2).

During last seven years e-commerce gained popularity in European Union. The rate of individuals using the Internet for ordering goods or services doubled from 20% in 2004 to 40% in 2010 (Figure 3). The EU citizens are also more keen to sell over the internet (Figure 3), as the rate of individuals using internet for selling goods rose from 5% in 2004 to 13% in 2010. From the enterprise point of view, the e-commerce trends seem to be optimistic as well. The share of enterprises turnover from e-commerce has risen from 9% in 2004 to 13% in 2009. The rising trends of e-commerce adoption should significantly affect the popularity of e-money solutions, which are developing in parallel with electronic economy (Figure 4).

³ Tertiary education participation

<http://epp.eurostat.ec.europa.eu/portal/page/portal/education/data/database>

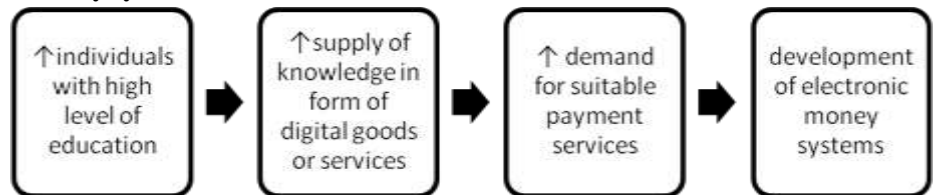
Figure 1: Individuals in European Union who ordered goods or services, over the Internet, for private use, in the last 3 months



Source: own work based on Eurostat data

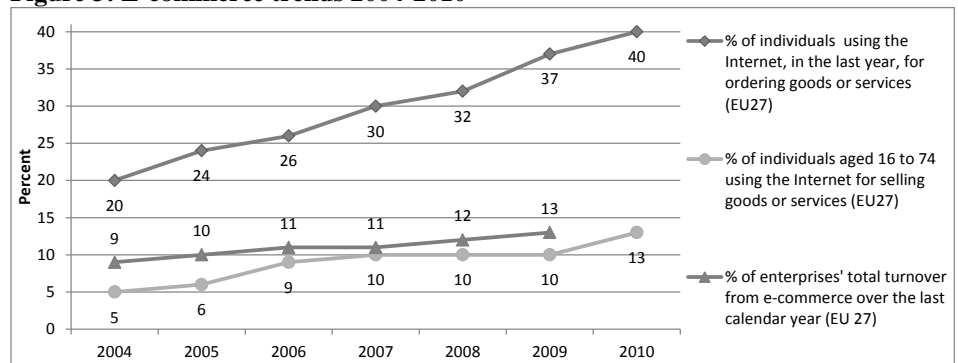
http://epp.eurostat.ec.europa.eu/portal/page/portal/information_society/introduction

Figure 2: Impact of education level on the development of information society and e-money systems.



Source: own work

Figure 3: E-commerce trends 2004-2010



Source: own work based on Eurostat data

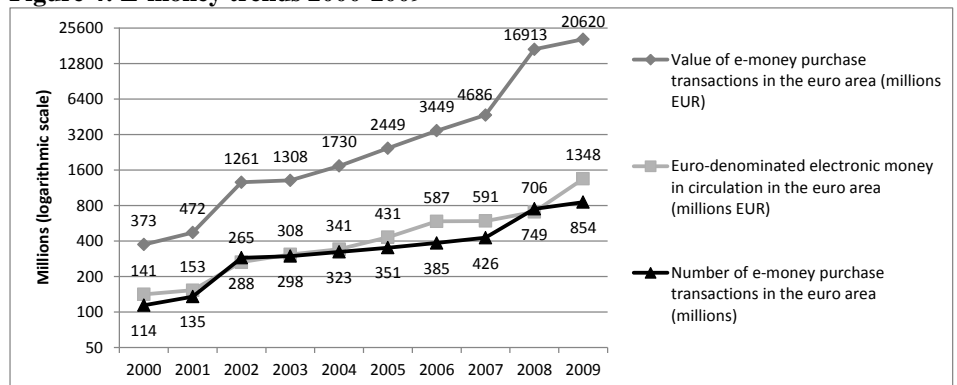
http://epp.eurostat.ec.europa.eu/portal/page/portal/information_society/introduction

Electronic money may act as handy mean of payment in the real world, especially during purchasing at vending machines or paying for public transportation. The electronic money payment can stand for an interesting alternative for using coins. If the potential clients have no billon, they are not able to make a purchase at vending machine. Moreover, if a vending machine is full of coins, the payment is impossible as well. In the case of a payment made by electronic money such problems cannot occur. Another use-case of electronic money system is related with a purchase of electronic tickets. Travelers using public

transport require convenient, time efficient way to pay for their tickets. The necessity to buy a paper ticket at newsagents or retail outlets, which are not permanently open, affects the quality of using public transport. The use of electronic ticketing system supporting e-money payments should allow travelers to buy electronic tickets directly in the vehicle and to be charged per exact time of ride.

The e-money trend analysis revealed that last decade was favorable for electronic money in Euro Area. The value of e-money in circulation increased steadily from 141 million Euro in 2000 to 591 million Euro in 2007 and according to European Commission this value has potential to reach the level of 10 billion Euro [COM(2008) 627]. The number of e-money purchase transactions quadrupled from 114 million in 2000 to 426 million in 2007. In parallel, the total value of e-money purchases increased significantly from 373 million Euro in 2000 to almost 4700 million Euro in 2007 (Figure 4).

Figure 4: E-money trends 2000-2009⁴



Source: own work based on European Central Bank data
<http://sdw.ecb.europa.eu/browse.do?node=3447413>

PayPal, after moving from UK and registering in Luxemburg in 2007 caused rapid increase in total value of e-money purchases in Euro Area in 2008 and 2009 (Figure 4). As the significant volume of PayPal transactions was not calculated in ECB statistics till 2008, this statistics does not allow determination of the trends concerning the volumes of e-money purchases. The weakness of this statistics is related with ECB assumption, that payment services offered by an institution registered in one country are not used abroad, e.g., ECB states that in Luxemburg the total value of e-money purchases amounted in 2009 over 14 billion EUR, what is economically unjustified and points that all European PayPal transactions were assigned geographically to Luxemburg.

It is impossible to measure economic activities on the Internet locally, because electronic economy is a global phenomenon, as consumers may easily

⁴ In 2007 Pay Pal moved from United Kingdom to Luxemburg causing significant rise in Statistical data in Euro Area.

make purchases all over the world (especially by buying digital goods or services) and enterprises may offer their products and services (e.g. payment services) globally over the Internet. The international or even intercontinental nature of electronic economy cause problems in collecting reliable and useful statistical data on phenomena occurring in this economy.

Electronic money is not only affected by the economy, but influences electronic economy as well. For instance, Szpringer states that “*development of electronic money accelerates formation of more effective global economy*” [Szpringer, 2008]. Moreover, e-payment is a part of e-businesses’ digital value chain [Meier, et al., 2009], because convenient payment method is one of e-business key success factor.

3. Technological factors

Modern economy requires an efficient payment method, capable of handy payments both in the Internet and in the real world. Such universal solution requires appropriate technology and standardization.

Since the first electronic money systems appeared in nineties of twentieth century, the technology changed significantly. Such phenomena as media convergence, ubiquitous access to Internet, expansion of mobile telephony, new short range communication standards and data exchange standards have been affecting the way the electronic money systems evolved.

The progressing media convergence caused Internet to become the main communication channel replacing wire telephony (e.g., Voice over IP), printed newspapers and books, radio and television, etc. As different media are provided by a single-type communication channel (i.e., Internet) and charged on pay-per-use basis, an opportunity was created for e-money providers to integrate payment services with the platforms offering digital products and services.

The next technical factor influencing operation of e-money systems is the development of GSM networks. GSM covered all Europe and allowed to access the Internet over GPRS/EDGE/HSDPA⁵ almost at any place. Moreover, the broadband Internet access gains popularity and is now being offered at reasonable prices. The ubiquity of the Internet caused that the operation of e-money systems, that in turn requires a connection with e-money server, is not limited anymore. Moreover, there is no need to apply advanced cryptography to prevent double spending of “digital coins” as e-money may be accessed over the Internet and transferred on-line from one e-money account to another, similar as in the case of electronic funds transfer.

Nowadays mobile phones gained a characteristics of microcomputers and evolved into the smartphones. The capabilities of modern mobile phones may be easily extended by installing new software or building-in additional hardware, in order to transform them into the flexible electronic payment instru-

⁵ GPRS (General Packet Radio Service), EDGE (Enhanced Data rates for GSM Evolution) and HSPA (High Speed (Uplink/Downlink) Packet Access) – are services allowing access to the Internet over GSM and UMTS networks.

ment⁶. As the mobile phones are very popular in European Union (statistically there are 125 subscriptions to the cellular mobile services on 100 inhabitants in EU 27⁷), these devices have great opportunity to be used as convenient payment instruments.

Rapid development of short range communication stands for another phenomenon, influencing the way electronic money systems operate. Near Field Communication (NFC) seems to be the breakthrough technology, nowadays being integrated with modern mobile phones. NFC has few features that determine its advantage over other short range communication technologies (e.g., Bluetooth and IrDa). First, NFC has a connection range up to 20 cm, which make it difficult to eavesdrop data transmission. Second, NFC is characterized by short set-up time⁸, counted in milliseconds, what makes this technology especially useful in the case of quick contactless payments. Former short-range communication technologies, such as Bluetooth and WiFi, usually require seconds to establish a connection and to start data transfer. Next, NFC enabled a mobile device to act in card emulation mode⁹, which enable this device to behave as a contactless smartcard¹⁰ [Finkenzeller 2010]. Similar to NFC technology at the client side, the Service Oriented Architecture (SOA) paradigm is expected to influence electronic money systems at the server-side (back office). SOA allows standardized access to different business services, that makes the integration of business processes easier. Moreover, compound services may be created based on less-complex ones [Cellary et al. 2009]. This possibility caused an appearance of new market, where complex services are based on other payable services. What is more, the e-money payment methods may be also offered as a service, that is why SOA based applications are the natural environment for e-money to operate in.

The above described technologies allow to construct electronic money system meeting the requirements of modern economy. Such a system should be designed according to the SOA paradigm, by enabling system participants to contact via services accessible over the internet. Moreover, NFC technology seems to be a suitable solution for contactless payments, because of security and efficiency reasons. Finally, the modern mobile phones are able to access the services over the Internet as well as to support NFC technology. That is why mobile phones are an appropriate candidate for the role of a handy payment instrument.

⁶ The examples of m-payment systems operating in Poland are the following: MPay, Mobilne płatności, Mobilet.

⁷ Telecommunication services: Access to networks (per 100 inhabitants)

http://epp.eurostat.ec.europa.eu/portal/page/portal/information_society/data/database

⁸ the time required for establishing connection and making transaction.

⁹ Card emulation mode cause that NFC generates radio field and is recognized by external readers as contactless smartcard.

¹⁰ Contactless Smartcard is a card equipped with microchip, which communicates with card reader via radio-waves.

Conclusions and future work

The macro-environmental analysis carried out in this paper revealed that macro-environment positively influences electronic money systems.

First, the analysis of political and legal factors shows that European authorities aim to liquidate legal uncertainty concerning e-money, by providing clear and consistent regulation. Moreover, continuous trend to support standardized solution by European authorities may be expected. Second, the appearance and development of information society created new market of knowledge in a form of digital goods and services. This new market drives a demand for e-money in order to minimize transaction costs. Moreover, there is steady rising trend in e-commerce evolution, which should positively impact e-money systems. However, the Internet purchases are not only just an application of e-money. The clients in brick-an-mortar shops or the individuals purchasing at vending machines require e-money as well. Third, nowadays technology is advanced enough to support development of flexible payment solutions, which would be able to meet the needs of both electronic and traditional economy.

Although the macro-environment of electronic money systems looks bright, there is still a need to analyze the micro-environment, especially the competitors, who provides e-money and electronic funds transfer. Further research allowing to determine and evaluate micro-environmental factors affecting operation of e-money systems in European Union is planned. The results of mentioned research will complement findings of this paper.

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Abstract

The aim of this paper is to identify macro determinants of electronic money systems operation in European Union. The analysis of macro environmental factors affecting e-money systems was performed in the following aspects: political, legal, economic, social and technological. First the legal regulations provided by European authorities and political trends in European Union were identified and evaluate. Then the impact of information society on economy and payment systems was presented. The influence of economic phenomena such as steady development of electronic economy and automation of goods purchasing in brick-and-mortar economy was presented and evaluated. Finally, the impact of new technologies on the way e-money systems operates was revealed, with emphasize on technologies enabling to create convenient e-money system operating in both virtual and real environment.

Streszczenie

Celem niniejszego artykułu jest identyfikacja i analiza czynników makrootoczenia wpływających na zastosowanie systemów elektronicznego pieniądza w Unii Europejskiej. Analiza została przeprowadzona z uwzględnieniem czynników politycznych, prawnych, ekonomicznych, społecznych i technologicznych. W pierwszej części tekstu zostały zidentyfikowane i ocenione uwarunkowania prawne i polityczne oraz kierunki zmian regulacji prawnych w Unii Europejskiej. Następnie został przedstawiony wpływ rozwoju społeczeństwa informacyjnego na gospodarkę i systemy płatności. Dokonano identyfikacji i oceny oddziaływania na aplikacje systemów pieniądza elektronicznego takich zjawisk, jak stabilny rozwój gospodarki elektronicznej oraz automatyzacja procesu sprzedaży dóbr i usług. W ostatnim etapie analizy został ukazany wpływ zmian powodowanych przez masowe zastosowania nowoczesnych technologii telekomunikacyjnych i informatycznych, ze szczególnym uwzględnieniem technologii pozwalających na wdrożenie systemów elektronicznego pieniądza umożliwiających płatności zarówno w Internecie, jak i sklepach tradycyjnych.