

Retail electronic money and prepaid payment instruments

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Abstract

The thesis describes the concept of retail electronic money (also referred to as stored value), provides a brief evolutionary overview of prepaid electronic payment instruments, and tries to reconstruct the development process of the new payment methods. Four types of schemes that exist in the EU and the USA—multipurpose prepaid cards, prepaid dedicated accounts, person-to-person online payment services and mobile customer accounts—are described. Subsequently, an overview of current trends and future prospects is presented. In a more theoretical manner, the development of prepaid schemes is put into the broader perspective of the evolution of payment systems in general, and the process of innovation. Based on that, several conceptual barriers to their adoption are suggested. Finally, regulatory environments in the EU and the USA are described and compared. The thesis aims to analyze the current and potential trends and their implications for payment systems.

Abstrakt

Práce popisuje koncept elektronických peněz (nebo také předplacené hodnoty), ve stručném přehledu nastiňuje evoluční vývoj předplacených elektronických platebních instrumentů a snaží se zpětně rekonstruovat vývojový proces nových způsobů placení. Identifikovány a popsány jsou čtyři typy instrumentů, které existují v EU a v USA—víceúčelové předplacené karty, předplacené účty použitelné pro platby registrovaným příjemcům z řad obchodníků, internetové platební služby umožňující obousměrné platby mezi uživateli a předplacené zákaznické účty vedené u operátorů mobilních telefonů. Následuje shrnutí současných trendů a nástin budoucího výhledu pro jednotlivé typy instrumentů. Vývoj předplacených platebních systémů je dále zkoumán na teoretické úrovni z hlediska evolučního procesu platebních systému obecně a z hlediska procesu inovace. Na základě této analýzy je identifikováno několik stěžejních bariér komplikujících přijetí nových platebních systémů potenciálními uživateli. Práci uzavírá stručný popis a srovnání základních aspektů regulatorního prostředí v EU a v USA. Cílem práce je analyzovat současné a možné budoucí trendy v oblasti elektronických peněz a předplacených platebních instrumentů a jejich implikace pro platební systémy.

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Abbreviations

3D SET	Three Domain Model for Secure Electronic Transactions
ACH	Automated clearing house
ATM	Automated teller machine
CEPS	Common Electronic Purse Specification
CHIPS	Clearing House Interbank Payment Systems
CPSS	Committee on Payment and Settlement Systems
CRM	Customer relations management
CSOB	Československá obchodní banka, a.s.
e-	Electronic
EC	European Commission
ECB	European Central Bank
EEP	European Electronic Purse
EFT	Electronic funds transfer
ELMI	Electronic money institution
EMEA	Europe, Middle East and Africa
EMV	Europay, MasterCard and Visa (specification)
EP	European Parliament
ePSO	Electronic Payment Systems Observatory
EU	European Union
FDIC	Federal Deposit Insurance Corporation
Fed	Federal Reserve
FRB	Federal Reserve Bank
FSA	Financial Services Authority
FSMA	Financial Services and Markets Act 2000
G10 countries	Group of Ten countries
GSM	Global System for Mobile Communication
HTML	Hypertext Mark-up Language
ICC	Integrated circuit card
m-	Mobile
MeT	Mobile Electronic Transaction, Ltd.
MLSA	Money Laundering Suppression Act
MO/TO	Mail order/telephone order
MPF	Mobile Payment Forum
MPP	Mobile proximity payment
MPSA	Mobile Payment Services Association
MSB	Money services business
NACHA	National Automated Clearing House Association
nap	Not applicable
nav	Not available
NBFI	Non-bank financial institution
NCCUSL	National Conference of Commissioners on Uniform State Laws
NDP	Non-depository provider of financial services
neg	Negligible
P2P	Person-to-person online payment service
PC	Personal computer
PDA	Personal digital assistant
PIN	Personal identification number

POS	Point-of-sale
PRS	Premium-rate service
QoS	Quality of service
SET	Secure Electronic Transaction
SIM	Subscriber identity module
SMS	Short Message Service
SSL	Secure Socket Layer
STP	Straight-through processing
SWIFT	Society for Worldwide Interbank Financial Telecommunications
Telecom	Telecommunication operator/company
UCLA CCP	University of California Los Angeles Center for Communication Policy
UK	United Kingdom
UMSA	Uniform Money Services Act
U.S./USA	United States/United States of America
VACs	Virtual wallets, accounts and channeling systems
WAP	Wireless Application Protocol

1 Introduction

New communication technologies have created both the opportunity to improve the effectiveness of existing payment transactions and the need for specific payment instruments suitable for the new type of (remote) transactions over open networks. Advanced information and telecommunication technologies have enabled the so-called “electronification” of the payment process; in other words, its full automation, including the provision of electronic means of payment.

For many years, bankers, technology specialists, entrepreneurs, and many others have been anxious for the replacement of physical cash and the introduction of more flexible, efficient and cost-effective retail payment solutions. Major advances in retail payment provision have been long predicted with globalization, liberalization, deregulation and digitalization—some of the trends establishing the information society. The potential benefits of a new payment landscape have been attractive for both consumers and merchants.

However, only a few “new” payment solutions have succeeded so far. Despite a few remarkable success stories, observers can also see many failures and many projected features of 21st century payments remain unrealized. Cash is still the most popular retail payment instrument.

Countless conferences and seminars discuss the concepts of cashless and check-less (or at least “less-checks”) society, reliable real-time remote payments, efficient high-volume/small-value electronic payments (for the purchases of intangible goods and services), full straight-through processing and swift cross-border payments. The actual status of their implementation cannot be judged on a general level, but the current progress certainly leaves room for improvements.

The first major success in improving the efficiency and comfort of retail payments was the advent of credit cards decades ago. Later, it was followed by debit cards. These initiatives brought greater effectiveness into face-to-face business-to-customer transactions, but they did not solve the problem of person-to-person payments or fit the needs of Internet payments.

Banks have recently introduced products designed to enhanced access to deposit accounts but transactions often take several days to settle and, in the case of cross-border transactions, come with significant costs that are often prohibitive for smaller-value payments. In addition, the justification of both banking and card processing fees remains controversial.

Although the previous paragraphs might have drawn a gloomy picture of today's retail payments scene, there are numerous notable (and promising) emerging payment solutions. One group of them will be in the focus of this thesis. Namely, the electronic payment instruments based on prepaid value or enabling to store prepaid value. The main reason for choosing this subset of innovative payment instruments was their continuity with the concept of electronic money as it is described in Section 3.3. Mapping the development and future prospects of electronic money was in turn the research objective of the project underlying this thesis.

Some stored-value products (or alternatively electronic money products) have become widely used and others have the potential to significantly change the existing payment procedures. Arguably, the focus on prepaid products and other selection criteria (in Chapter 4) leaves behind some considerable initiatives (e.g., functional and technological innovations at the point-of-sale and new access products), but the focus is necessary given the limited scope of this project and the mass of different payment schemes. This thesis also limits its focus to schemes available in Europe and the USA.

The motivation for this thesis was to find out about the current situation of electronic money. It was clear at the very beginning of the research project that e-money drew a lot of attention from governments and the public in the 1990s, but the current state of market initiatives in the field was unknown. The major questions were thus: Does e-money still exist in practice? If so, what form does it take, how does it differ from what was originally referred to as e-money, and to what extent and where is it used?

Research conducted to find the answers brought up new questions and challenges. Many of the questions were related to the future prospects of the schemes found. What is the potential of their future proliferation? Which ones are going to play an important role in future payments, and which of them represent only transitory solutions destined to disappear? What is their value proposition? Is there a real need for a particular scheme in

the medium term? What will be the reaction of current market players to the new trends? What barriers to acceptance does a particular scheme face? Other important considerations included legislation and regulation. How relevant is the existing legislation to the existing systems? What actions do the regulators take?

Besides finding, characterizing and (when possible) testing particular schemes that may have fallen within the scope of the thesis, a major challenge was to define e-money itself and to create consistent selection criteria for the instruments that fit this definition and thus deserve further analysis. Some clues were provided by existing literature, but a single unified framework did not exist and had to be created. Due to rapid changes in the area, all the information gleaned from existing sources had to be checked for validity and topicality against other sources.

Based on the above, the specific goals of the thesis were established. They were:

- 1) to create a unified framework for analysis based on a research of the literature;
- 2) to put the current developments in the area of prepaid payment systems into a broader context of payment systems evolution and the process of innovation;
- 3) to identify a set of instruments that are currently used in the EU and USA markets;
- 4) to create a specific criteria for the selection of the types of instruments that conform to the established definition of e-money and are used in the market;
- 5) to classify the selected instruments;
- 6) to describe the features of the instruments in the established classification categories;
- 7) to summarize current market trends for the individual types of instruments;
- 8) to suggest the future prospects of the individual types of instruments;
- 9) to identify barriers to adoption of innovative payment instruments; and

10) to research, evaluate and contrast the existing legislation and regulation in the EU and the USA.

The overall goal was to analyze the current developments in the field of prepaid payments and their implications for payment systems in order to provide a background for reasonable projections about future trends. The thesis is not meant to be an exhaustive survey of all developments in the field of retail electronic payments. Neither should it to cover all the issues relevant to these developments. Rather, it aims to put the current developments into a broader context, to describe, classify and analyze a specified segment of initiatives, to discuss several key issues, and to thus provide a background for reasonable projections about future trends.

As with any document handling a current topic in a rapidly changing environment, some parts might soon get out of date. To partly compensate for this effect, links to updated sources of information are included.

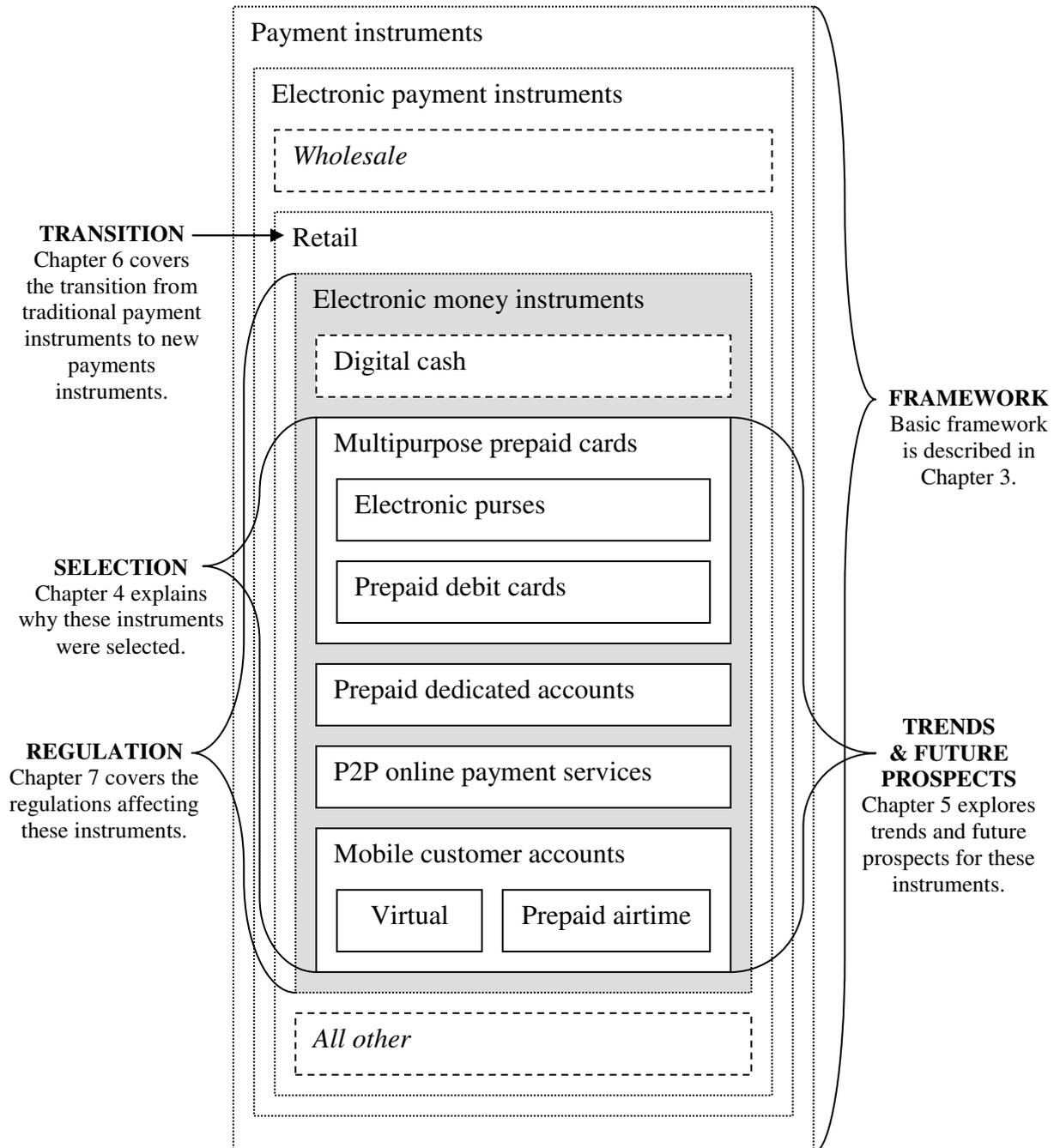
In many cases, no official statistics about various payment systems are collected and one needs to rely on published estimates. Because these estimates are often based on survey data and similar undisclosed sources, their accuracy is questionable. It is not unusual for reputable sources to quote publicly unavailable statistics without including essential characteristics about the data. Methodological comments are also precious.

In the rare situations when official statistics are available, the recentness of the data, the definition consistency and harmonized reporting (in the case of cross-country comparisons) determine their usefulness.

The symbols and abbreviations \$, €, £ and CZK denote legal tenders of the United States of America (USA), the Member States of the European Union (EU) participating in the common currency, the United Kingdom (UK) and the Czech Republic respectively.

2 Graphic outline

The following figure outlines the structure of this thesis.



3 Basic framework and definitions

This chapter defines some essential terms and introduces a basic framework for the purpose of the further discussion. It defines electronic payments, distinguishes wholesale and retail payment systems, and dedicates a brief note to several systemic considerations concerning specific features of electronic payments. This should not replace a discussion of security. Security and privacy issues are out of scope of this text due to their complexity and technical nature.¹

After establishing the basic payment-related terms, the concept of electronic money is introduced using regulatory definitions. However, the regulatory definitions are not binding for the scope of this text. The selection criteria used to determine which “electronic money” instruments are covered is formulated on a different basis, and is described later on.

Following the discussion of the concept of electronic money, an evolutionary crosscut of relevant payment instruments is presented to suggest a possible reconstruction of how the new electronic payment methods developed. The chapter concludes with several methodological comments on distinction between “traditional” and “new” payment instruments as these terms are used throughout.

3.1 Payment

3.1.1 Definition of payment

There are different definitions of a payment. According to the ECB (2003), a payment might be broadly defined as “a payer’s transfer of a monetary claim on a party acceptable to the beneficiary” (p.61). In a retail transaction, this monetary claim is represented by money provided by a central bank or by deposits (or other liabilities) at a financial institution. Recently, non-banks’ liabilities have been also used as acceptable claims in retail transactions.

¹ Security building capabilities of public key cryptography/infrastructure and digital signatures related to major risks of different payment schemes are discussed in Centeno (2002). The description of security- and trust-related issues in e-commerce payments and a summary of some non-technological consumer protection and anti-fraud measures can be found in Centeno (2002b). General electronic money systems security objectives (derived using a model based on Common Criteria) are laid down in ECB (2003b).

A non-cash payment transaction usually involves four parties. These are the payer, the beneficiary and their financial institutions (the intermediaries). The transaction is processed through a fund transfer infrastructure.

3.1.2 Means of payment

Means of payment refers to the monetary claims on assets accepted by the beneficiary to discharge a payment obligation. It is worth noting that the means of payment are sometimes understood as the assets themselves, as opposed to the claims on assets. However, the former correspond to a significantly more important part of today's payment processes.

One can further distinguish between primary and secondary means of payment. Primary means of payment ("central bank money") consist of banknotes and coins (cash) issued by a central bank and credit entries in the books of a central bank. Secondary means of payment are claims that carry a legal guarantee to be recovered into the central bank money. Typically, these are represented by balances on current accounts at deposit-taking institutions. They are also referred to as "commercial bank money".

The obligation of deposit-taking institutions to recover the balances back into the central bank money is described as "redeemability" requirement. This requirement makes claims on credit institutions a trustworthy means of payment despite the fact that they only rely on a tacit contract of acceptance. Trust is, of course, the common denominator of well functioning means of payment. If the trust in a particular means of payment disappears, the users switch to a different one.

3.1.3 Payment instrument

A payment instrument can be generally defined as "the forms and processes used to effect the change of ownership of a means of payment" (Soramäki and Hanssens, 2003, p.3). Payment instruments can be also described as tools to initiate a transfer of the means of payment. The means and instruments usually differ, but an obvious exception is cash.

3.2 Electronic payment

3.2.1 Definition of electronic payment

Authors involved in the ePSO² forum suggested a definition of electronic payment as a transfer of an electronic means of payment from the payer to the beneficiary using an electronic payment instrument. Following the forum's basic framework, electronic means of payment are the means represented and transferable in electronic form. Based on that, it is possible to define electronic payment instruments as “instruments where the forms are represented electronically and the processes to change the ownership of the means of payment are electronic” (Soramäki and Hanssens, 2003, p.4).

There is a wide range of electronic payment instruments in use today. These include, for example, direct debits, debit cards, credit cards, credit transfers or the tools of cumulative collection services and payment portals. Besides these,³ there is a group of retail prepaid payment instruments that are the focus of this thesis.

3.2.2 Wholesale and retail payment systems

The word “retail” used in the previous paragraph as well as earlier in the text needs further clarification. Electronic payment systems can be divided into two major groups: wholesale and retail.

Wholesale payment systems are used for non-consumer (usually high-value) transactions. Examples of these systems include SWIFT,⁴ CHIPS⁵ and Fedwire.⁶ The transfers based on them are beyond the scope of this paper.

² Electronic Payment Systems Observatory (ePSO) is a research project of the European Commission's Institute for Prospective Technological Studies. See also <http://www.epso.info> (accessed March 15, 2005).

³ The number of payment instruments distinguished depends on the classification criteria. One “basic” instrument (e.g., a credit card) can take different forms. Furthermore, there can be applications of an instrument that, due to specific (often innovative) features, are considered a separate instrument. In some cases, even the distinction between an instrument and a distribution channel may not be perfectly clear.

⁴ SWIFT (Society for Worldwide Interbank Financial Telecommunications) is a non-profit cooperative with headquarters in Brussels. SWIFT is actually a financial messaging system. It presupposes a separate system for effecting the payment.

⁵ CHIPS (Clearing House Interbank Payment Systems) is a private sector system owned and operated by the New York Clearing House Association, an organization of banks in New York City. CHIPS is an online, real-time electronic payment system that transfers and settles transactions.

Retail payments systems enable consumer transactions through electronic payment instruments mentioned in the previous section. For example, an online point-of-sale (POS) card transaction in the United States may be routed through a regional EFT⁷ network and immediately settled, or routed through Visa/MasterCard networks and settled using the ACH Network⁸ in 1–3 days. This thesis describes payment instruments that utilize retail payment and settlement networks, but does not discuss the networks themselves.

It is worth noting that transactions performed through some prepaid payment instruments described later do not necessarily rely on the mentioned online networks. For instance, a stored-value smart card can operate as a stand-alone device using its embedded microchip.

3.2.3 Systemic threats stemming from distinctive features of e-payments

Like any payment mechanism, electronic payments schemes need to respond to potential systemic threats. While some of threats are common to all payment systems, others stem from the distinctive features of electronic payments.

Bearer instruments generally face the problem of counterfeiting. Less experience and the possibility of perfect copying makes this a more serious issue in the case of electronic payments. Furthermore, they are subject to low-cost mass attacks.

The anonymity of some schemes raises the question of how to prevent fraudulent transactions. That is why security measures need to be put in place. On the other hand, the use of electronic payments generates information that can be used for other than

⁶ Fedwire is a real time payments system operated by the US' Federal Reserve for financial institutions that have either reserve or clearing accounts at one of the Federal Reserve Banks.

⁷ EFT is a commonly used acronym for “electronic funds transfer”, a generic term describing any transfer of funds between parties or depository institutions via electronic data systems.

⁸ ACH (Automated Clearing House) Network is a United States' nationwide batch-oriented electronic funds transfer system governed by NACHA (National Automated Clearing House Association) operating rules. The Federal Reserve, American Clearing House Association, Electronic Payments Network and VisaNet ACH Services act as ACH operators. ACH Network is primarily used to conduct high volume repetitive transactions.

transactional purposes. Therefore, personal data protection and privacy need to be addressed as well.

Despite the threats, electronic payments have a great potential. Some of the advantages over “traditional”⁹ instruments are reduced transaction costs, availability of fast low-value transactions, remote access and real-time processing and settlement.

3.3 *Electronic money and stored value products*

3.3.1 Definition of electronic money

The term “electronic money” (or “e-money”) is often used loosely to refer to various retail payment schemes. This thesis equates e-money with some form of prepaid value and primarily follows the framework established by the European Parliament (EP) and the Bank for International Settlements (BIS).¹⁰ Nevertheless, applying this framework can cause ambiguity of at least two kinds.

The first one could be described as “same terms but different meaning”. For example, in the context of the UK’s Financial Services Authority, one might refer to an “e-money” scheme, which may or may not be considered an “e-money” scheme from the point of view of the ELMI Directive (EP, 2000).

The second kind of possible ambiguity relates to determining whether a particular scheme uses e-money within one specific legal framework. Bernkopf (1996) suggests that identifying electronic money may not be as straightforward as answering a simple yes-or-no question. Rather, what is and what is not e-money might be a matter of a degree.¹¹

⁹ The distinction between traditional and new payment instruments is not simple and unambiguous. See Section 3.4.

¹⁰ The title of this thesis may suggest that e-money is simply the means of payment used for paying with electronic prepaid payment instruments. This is often true, but may not be. What matters is the point of view and the framework used for analysis. One can start with a legal definition and try to find schemes that fit this definition, or alternatively begin with existing schemes that fulfill certain criteria, denote these as e-money schemes, derive the substance of e-money and then find its place in the law.

¹¹ Bernkopf (1996) considers an example of a closed proprietary payment network based on single-purpose stored-value cards that step-by-step increase their acceptance both geographically and application-wise. Other related issues like the “currency versus incentive points” problem are also mentioned in this thesis.

Since this section aims to define a basic framework and provide a common-sense notion of e-money, the remainder does not discuss the potential weaknesses of the legal definitions. Some further considerations can be found in the Chapter 7.

Generally, the definition of e-money can be seen from a technical perspective (through specifying a set of technical/technological features that an e-money scheme needs to match) or from a functional perspective (through establishing the core functionality of systems rather than its technical appearances).

The European Parliament (EP, 2000) defines electronic money as a monetary value represented by a claim on the issuer, which is:

- 1) stored on an electronic device;
- 2) issued on receipt of funds of an amount not less in value than the monetary value issued;¹² and
- 3) accepted as means of payment by beneficiaries other than the issuer.

In the Article 3(1), EP (2000) also specifies that “a bearer of electronic money may, during the period of validity, ask the issuer to redeem it at par value in coins and bank notes or by transfer to an account free of charges other than those strictly necessary to carry out that operation”.

In a similar fashion, BIS defines electronic money as a liability of the issuer. E-money products are then products “intended to be used as a general, multipurpose means of payment” (CPSS, 2001, p.9).

BIS contrasts e-money with single-purpose prepaid schemes offered by many companies (e.g., telecommunication operators) that enable prepayment for the companies’ products and services. BIS also distinguishes e-money from so-called access products that allow consumers to use conventional payment services through electronic distribution channels, for example, online banking.

¹² Electronic money is viewed as a surrogate for coins and banknotes. Although it is subject to redeemability, it should not be regarded as deposit or other repayable funds as defined by EP (2000b). The issuance of electronic money does not constitute in itself a deposit taking activity.

It was once commonly expected that a record of funds available to the consumer (e.g., the balance on an e-money instrument) was stored on an electronic device in the consumer's physical possession. This rule (excluding remote server account-based schemes) is not necessarily required any more.

3.3.2 Multipurpose prepaid cards and network-based products

Both definitions above primarily suited two types of instruments: multipurpose prepaid cards (also called stored-value cards or electronic purses) and network-based (or software-based) products. These instruments were originally created to substitute for cash. Some aspects of the altered "cash-like" functionality remained important features of e-money.

Multipurpose prepaid cards are smart card applications that enable the consumer to upload, store and spend monetary value. They will be discussed in detail later.

Network-based products were introduced for the use on open network like the Internet as "digital cash". The concept of digital cash is based on digitally signed messages (tokens) that serve as the means of payment.¹³ These tokens then circulate as a general liability of the issuer. A notable feature of the digital cash is the fact that a withdrawal of the tokens by one consumer does not result in an immediate credit to another consumer's account.¹⁴

After several serious attempts to launch digital cash schemes,¹⁵ network-based products have practically vanished. The most frequently identified causes of their demise were the lack of user-friendliness, distrust of the system by consumers and the wrong business/revenue model of the providers.

¹³ In a digital cash scheme, customers purchased digitally signed electronic certificates (tokens) from a bank or another currency provider. Providers of digital cash issued tokens that represented either units of national currency or their own "private currency". The tokens could then be transferred without the involvement of a financial institution. It contrasted with the usual transaction model, where one consumer account is debited and a second consumer's account is simultaneously credited. Digital cash concepts exploited public key cryptography.

¹⁴ Essentially, a consumer withdraws or buys tokens of certain amount from the issuer and uses them for a payment. The acquirer of the tokens presents them to the issuer, the issuer makes sure they have not been spent and provides the acquirer with newly generated tokens of an equivalent amount. In practice, these operations were done automatically by software programs.

¹⁵ Cyberbucks project by DigiCash was launched as an experiment in 1994. Further exploration came later in 1990s when several commercially introduced services gained popularity.

Digital cash should be distinguished from other instruments that have appeared (and mostly disappeared) later on, namely account-based micro-payment¹⁶ loyalty schemes. These “new kinds of money”¹⁷ like beenz or flooz¹⁸ succeeded to blur the line between incentive point schemes and digital private currencies.¹⁹ Like digital cash, they did not survive the end of the Internet hype.²⁰ Acknowledging evident flaws, Godschalk (2001) hints that Internet private currencies might have come ahead of their time.

3.3.3 “Second wave” paradigm shift

The difference between network-based payment systems and incentive/loyalty schemes,²¹ like those just mentioned, can be viewed in a broader perspective. Böhle (2001) suggests an evolutionary approach to reconstruct the development of the new electronic payments. Four consequent phases are proposed: (1) pre-history; (2) pioneer; (3) banking sector initiatives; and (4) the “second wave” of Internet payments.

The pre-history relates to the early stages of the World Wide Web in the 1980s and the beginning of 1990s. Before the Internet was widely recognized as an opportunity for e-commerce, the first new electronic payment instruments were already in place: POS systems, prepaid single-purpose cards,²² electronic purses²³ and micro-billing systems.²⁴ The theoretical concept of digital cash existed and some trials were pursued.

¹⁶ Carat (2002) following the ePSO criteria defines micro-payments as transactions of value lower than €5. Other sources suggest larger amounts. In practice, micro-payments are often smaller than €5.

¹⁷ This is what Beenz.com called its service in a promotional campaign.

¹⁸ Beenz and flooz were private currencies issued by Beenz.com and Flooz.com respectively. Beenz.com was founded in March 1998, Flooz.com consequently started in September 1999. Both services were discontinued in August 2001.

¹⁹ Although these schemes might seem similar to software-based products, they are essentially different. Unlike software-based products, micro-payment systems use private currencies as a means of payment and apply the account-based transaction model. Users of micro-payment systems did not have the right to redeem the private-currency balances against the primary or secondary means of payment.

²⁰ In fact, some of the services survived, but play only a marginal role. See, for example, <http://www.e-gold.com> (accessed March 15, 2005).

²¹ If applying a technical approach, some prepaid account-based schemes may not fit the regulatory definition of electronic money. For example, server-based accounts are in the user's “logical possession”, but not in his “physical possession” (Association of E-money Institutions in the Netherlands, 2002).

²² For example, the prepaid smart cards for public phones.

²³ The first nationally recognized multipurpose prepaid card was Denmark's Danmønt launched in 1992.

Consequent pioneer phase of electronic payments saw further expansion of digital cash on the Internet and new electronic purse initiatives. For example, the Mondex²⁵ prepaid card attracted attention due to its person-to-person functionality.

Most of the schemes that appeared in the pioneer phase were non-bank projects. That can explain why the subsequent development was mostly characterized by banking sector initiatives. Credit card associations also made great efforts to adjust existing schemes to the virtual world. The SET²⁶ protocol for secure credit/debit card²⁷ transactions on the Internet was jointly developed by Visa and MasterCard. At the same time, the instruments of the first generation of Internet-based payments (software-based products) appeared not to be viable as major providers discontinued their services.

The “second wave” paradigm shift can be characterized by the use of a server-based (i.e., involving a payment host) approach to online payment services.²⁸ The server-based payment systems take a more thorough approach towards the specific demands of consumers, and attempt to meet requirements related to the particular features of digital goods and services.

Böhle (2001) distinguishes “front-end” and “back-end” innovations resulting from server-based payments. At the front-end, customers enjoy greater convenience of a direct

²⁴ Electronic billing and micro-billing were enabled by the development of home banking applications.

²⁵ Mondex was first practically tested in Swindon, UK. The experiment was conducted by a joint initiative of National Westminster Bank and Midland Bank.

²⁶ SET means Secure Electronic Transaction. SET was a comprehensive encryption-based solution, which, however, never gained acceptance. It seems that the major barriers were a lack of distribution channels and portability for cardholder digital certificates, the required software installation on a cardholder’s PC, a general lack of user-friendliness, a lack of usefulness from the merchants’ perspective, and perhaps the chicken-and-egg problem described in Section 6.3.1. Although 3D SET addressed some of the deficiencies of the original SET, SSL in combination with additional authentication mechanisms is predominantly used for secured Internet credit/debit card transactions at the beginning of 2005.

²⁷ The denotation credit/debit card is used when referring to credit and debit cards in the context of their usage for Internet (virtual POS) payments. It is also used as a general term for other closely related products, such as charge cards. Occasionally, “credit card” is used (for example in the form of an adjective) to refer to a broader range of products as it is commonly done in countless resources. An exact distinction is made when necessary.

²⁸ An often-mentioned parallel to this change in approach is the switch from “fat wallets” to “thin wallets”. Fat wallets are schemes based on a download and installation of specific software that performs most of the operations related to payment processing. Thin wallets require only minor participation of the client computer in the payment functions (e.g., a Web browser plug-in).

login into their virtual accounts, as opposed to the necessity to download and set up specialized software.

At the back-end, a central server can host multiple payment schemes and offer value-added services.

The new paradigm was embodied in “thin SET wallets”²⁹ for credit card transactions, direct debits and credit transfers. Systems based on prepaid virtual accounts suitable for micro-payments and person-to-person online payments also incorporate the principles of the second wave.

3.3.4 Mobile payments

In general, a mobile payment (also known as m-payment) is an electronic payment made through a mobile device (e.g., a cell phone or a PDA³⁰). This section describes several basic concepts in mobile payments. “Telecom” refers to a telecommunication operator.

Krueger (2002) states that mobile devices are expected to play an important role in commercial transactions. The positive market forecasts are based on high and increasing penetration of mobile phones in many countries. The opportunity for mobile commerce (m-commerce)³¹ is seen in the development of the third generation telecommunications network and in the emergence of new applications that go beyond simple voice and data transport.³² Mobile payment is viewed as an important enabler of m-commerce.

3.3.4.1 Definition and classification of m-payment schemes

Mobile payment services could be described as services, which use mobile devices to initiate and confirm electronic payments.

²⁹ For example, Visa’s 3D SET protocol allowed the creation of “virtual wallets”—server-based accounts facilitating traditional forms of payment such as credit transfers or debit and credit card transactions.

³⁰ A Personal Digital Assistant (PDA) is a small handheld computer.

³¹ M-commerce refers to business activity carried on mobile (cellular) networks, usually related to a broader range of goods and services than pure transmission of voice and text communication.

³² Eventually, pure data transport is expected to become a low-margin “commodity” business. Although “voice, text and data” services are often distinguished, it is obvious that all mobile traffic is essentially “data” transport.

Yet, a more precise and broadly agreed-on definition of m-payment (e.g., a legislative or regulatory one) is not available. The public “top-down” initiatives remain in the state of draft proposals, and most of the cooperative activity happens in various industry forums.

Mobile payments can be classified by the time structure (i.e., time of payment relative to the time of delivery or acceptance of goods and services), the payment value and the service domain similarly to other electronic payments.

3.3.4.2 M-payment provider participation models

From the point of view of service provider participation, Faber et al. (2003) distinguish:

- 1) bank-oriented initiatives: banks adapt their financial services to mobile distribution channels, e.g., mobile banking;
- 2) telecom-oriented initiatives: telecoms exploit their advantage of a wide customer base, established financial relationships with customers and experience in (micro-) billing and prepaid services and provide payment services for other products and services than their own;
- 3) balanced/mixed initiatives: banks and telecoms cooperate in the creation of mobile payment services; and
- 4) independent initiatives: payment service providers launch innovative services that are relatively independent of banks and telecoms.³³

A participation (cooperation) model is often embodied in the ownership structure of the service providers.

3.3.4.3 Mobile authentication solutions

From a technical point of view, Faber et al. (2003) identifies three main options for integration of payment authentication into mobile devices (particularly phones):

- 1) single (or shared) chip solution: authentication functionality and communication functionality³⁴ are integrated in one chip;

- 2) dual chip solution: authentication and communication functionality are separated in two chips, one provided by the payment service provider, the other one by the telecom; and
- 3) dual slot solution: the authentication function is built in a carrier (card) separate from the mobile device, an external or internal card reader intermediates the communication of the card and the mobile device.

3.4 Traditional and new payment instruments

After having read the previous sections of this thesis, one might ask, “What is the difference between traditional and new payment instruments?”

Undoubtedly, a rigorous distinction between “traditional” on one side and “new”, “innovative”, “emerging” payment instruments and services on the other would be useful. However, the definitions (or rather notions) of the new payment instruments, differ among relevant resources.

Typically, new electronic payment instruments are characterized by innovative functions not present at the traditional ones, e.g., swift person-to-person electronic transfers, small-value retail payments and instant clearing. The instruments that were originally created in response to the needs of e-commerce and m-commerce are usually considered new. Electronic money applications (as defined in this thesis) are considered new as well.

The innovation of the non-traditional instruments is in the core of their functionality. It does not imply that the innovative services, in practice, would be “new” in terms of being totally independent of existing systems. At least the upload and the withdrawal of the funds need to be somehow linked to an existing payment infrastructure (possibly with a disputable exception of prepaid dedicated accounts). Furthermore, it is particularly the group of new services, that combine different payment options, that have recently shown impressive results.

³³ Independent providers use the service infrastructure provided by banks and telecoms.

³⁴ By communication functionality, relevant processes ensuring the common voice and data transfer services are meant.

To conclude the discussion of traditional and innovative payment instruments, a basic classification according to ECB (2003) is reproduced in Table 3.1.

Table 3.1

Classification of payment instruments/means of payment

Traditional payment instruments	Means of payment
Banknotes and coins	Central bank money
Credit transfers	Commercial bank money
Debit instruments	Commercial bank money
Credit cards	Commercial bank money
New payment instruments and services	Means of payment
Electronic money 1)	E-money
Personal online payments 2)	Commercial bank money, e-money or “company money”
Scratch cards	Commercial bank money, e-money or “company money”
Payment portals	Commercial bank money, e-money or “company money”
Cumulative collection	Commercial bank money, e-money or “company money”
M-payments	Commercial bank money, e-money or “company money”

Notes:

In the EU “company money” is allowed in small-scale initiatives under the waiver permitted by the E-money Directive, provided it is not ruled out by other national provisions.

Author's Notes:

1) This thesis refers to this category as e-money products.

2) These are payments via person-to-person online payment services.

Source: ECB (2003)

4 Selection criteria and corresponding payment instruments

A wide range of heterogeneous initiatives has been pursued up until today. Even after eliminating those schemes that have not proven viable (some of them were briefly described in the Section 3.3.2) and when focusing on widely used instruments, it is impractical to cover all types of schemes within one document. Some selection criteria must be applied to the mass of instruments.

This chapter explains the motivation behind such criteria, formulates them, and matches them with corresponding payment instruments. The instruments and the services that enable these instruments are described afterwards with examples of existing schemes for the reader's orientation and reference.

4.1 Motivation behind the criteria selection

The motivation behind the criteria selection for the purpose of this thesis is twofold. First, the goal of the project is to explore recent and potential future trends in retail electronic payments. Thus, the schemes that have not proven viable in the past are excluded. Second, the investigation into the recent developments was supposed to tag on the “historical” definition (notion) of electronic money. The value of preserving the continuity with e-money as it was defined in Section 3.3.1 may not seem evident at first sight, but appears meaningful in light of recent approaches to retail e-payments.

In the last few years, instruments based on electronic money have provoked countless debates because they use a new means of payment, which could potentially have an impact on existing financial markets and the economy in general. Whether these concerns have solid grounds or not might not be easy to evaluate. However, electronic money has caused political discussions resulting in regulatory responses.

A feature common to e-money products and other prepaid payment instruments is their reliance on prepayment. The payer transfers monetary value in advance to a personalized account at a payment service provider or to an electronic device (e.g., a smart card). After that, these funds can be used to make payments to other participants in the scheme. This

approach can contrast with the initiatives that merely³⁵ take the traditional instruments based on traditional means of payment and extend their functionality to new applications or environments.³⁶

4.2 Selection criteria

Following the described rationale, this thesis will focus on the payment instruments (and the derived services) that:

- 1) enable a repeated upload, storage and spending of monetary value;³⁷
- 2) are primarily intended for making payments for consumer goods and services;
- 3) are based on electronic means of payment;
- 4) are multipurpose;
- 5) are offered directly to consumers;³⁸
- 6) are not (traditional) bank deposit accounts;³⁹ and
- 7) have been commercially deployed in the EU or the USA.⁴⁰

Another feature that needs to be mentioned is the redeemability. Although it is characteristic for e-money schemes, it is not necessarily present in other instruments,

³⁵ Sometimes the “mere extension” can be quite significant, if not revolutionary (e.g., eCheck initiative in the US), in which case one needs to follow the arbitrary condition of prepayment to maintain focus. A justification of the approach might be the fact that the schemes based on traditional means of payment tend to cause less concerns about their monetary policy and regulatory impacts.

³⁶ Apparently, the distinction between the new instruments and the adaptations of traditional instruments is ambiguous. Both types address the new needs of e-commerce and m-commerce or the efficiency requirements of face-to-face transactions.

³⁷ All these operations are done upon proprietor’s will, which is why loyalty schemes do not meet the criteria.

³⁸ Payment solutions developed by payment service providers for merchants, financial institutions or telecommunications operators are not covered unless they are promoted as independent products. It is also understood that the covered schemes are open to a general consumer base, as opposed to being proprietary systems.

³⁹ As defined by EP (2000b)

⁴⁰ Only “significant” projects that have been available to consumers are considered.

such as prepaid dedicated accounts. That is why it is excluded from the list above. Redeemability provides the user with a guarantee that the funds can be withdrawn at par value in coins and banknotes (of a central bank's currency) or by a transfer to an account (held at a deposit-taking financial institution).⁴¹

4.3 Corresponding instruments

Instruments characterized by the conditions above are products based on prepaid value that provide the issuer with an interest free credit. They are distinguished by the characteristics of the corresponding payment schemes, because an exact description of these instruments is problematic and impractical.⁴² At least four basic groups of schemes⁴³ (and thus instruments) can be recognized:

- 1) multipurpose prepaid cards;
- 2) prepaid dedicated accounts;
- 3) person-to-person online payment services (P2Ps); and
- 4) mobile customer accounts.

From the perspective of redeemability, multipurpose prepaid cards and P2Ps typically meet the requirement, mobile customer accounts meet it in some cases and prepaid dedicated accounts often do not meet the requirement.⁴⁴

⁴¹ According to EP (2000), the only charges that should apply are those strictly necessary to carry out the transaction.

⁴² The actual instruments can be viewed as forms and processes used to effect the change of ownership of e-money/prepaid value that utilize/are based on the listed items. For consistency and simplicity, this thesis refers to the listed items as the instruments.

⁴³ The listed items should be perceived in a broad sense as a set of functions and processes. For example, "prepaid dedicated accounts" refers to a specific group of complex payment systems based on prepaid accounts, not to pure records of balances.

⁴⁴ The "dedicated" prepaid value only leaves the system via purchases with registered merchants. On the other hand, in some cases regulatory requirements might require issuers to return the monetary value to consumers when they request it.

4.3.1 Multipurpose prepaid cards

Within multipurpose prepaid cards, at least two different groups of schemes can be distinguished: electronic purses (card-based e-money) and (mag-stripe⁴⁵) prepaid debit cards.⁴⁶

4.3.1.1 *Electronic purses*

Electronic purses (e-purses) use a chip (smart card) to store a monetary value, which can be used as a multipurpose means of payment. E-purses were designed for common, small-value payments. They are supposed to remove the difficulties of carrying and handling physical cash, especially small change, and thus should enable fast, flexible payments without the necessity of an online authorization.

The monetary balance stored in the chip of the card can be increased (in other words, the e-purse can be reloaded) in different ways depending on a particular scheme, e.g., by a credit transfer from a bank account or by a cash deposit. The reloads can be initiated, for example, from an ATM that is compatible with the scheme. E-purses can be used for payments at attended or unattended POS terminals. In general, these terminals are different from the ones used for mag-stripe cards from both technical and functional perspective. Nevertheless, it is possible for a single terminal to incorporate both technologies.

The new generation of smart cards enables a combination of several payment methods and other applications on one microchip. These smart cards are also referred to as “multi-application cards”. Their advantage is that the costs of the system build-up can be spread over many applications, which enhances the business case. In practice, banks and other issuers have started to issue payment cards that incorporate both a magnetic stripe

⁴⁵ Mag-stripe cards are payment (or other) cards with embedded magnetic stripe used to store the authentication information. Magnetic stripe is currently the most common card technology.

⁴⁶ More precisely, prepaid debit cards could be denoted as payment cards linked to prepaid virtual accounts. The notation used here may differ from those used in practice. Cards linked to prepaid virtual accounts are often simply referred to as “prepaid cards” or even “cash cards”. Other names are discussed in the Section 4.3.1.2.

and a chip. Such cards, however, do not necessarily include the e-purse application. The chip can be used purely for authentication.⁴⁷

Some examples of e-purses are Avant (Finland, <http://www.avant.fi>, accessed March 4, 2005), Chipknip (the Netherlands, <http://www.chipknip.nl>, accessed March 18, 2005), GeldKarte (Germany, <http://www.geldkarte.de>, accessed March 18, 2005), MiniCASH (Luxembourg, <http://www.cetrel.lu>, accessed March 4, 2005), Moneo (France, <http://www.moneo.net>, accessed March 15, 2005) and Proton (Belgium, <http://www.proton.be>, accessed March 15, 2005).⁴⁸

4.3.1.2 Prepaid debit cards

Established payment providers have tried to resolve the chicken-and-egg problem of gaining critical mass (described in Section 5.1) by creating products that are compatible with the existing (“old”) terminals. These products form the second group of multipurpose prepaid cards.⁴⁹

These multipurpose prepaid cards can be used for payment at places where traditional “brand”⁵⁰ credit/debit cards are accepted. These cards are not chip-based; their basic physical features are identical to conventional embossed credit/debit cards. However, they are linked to prepaid virtual accounts, as opposed to checking or credit card accounts.⁵¹ There is no interest paid on the outstanding balance of the virtual accounts. There is also a limit on the maximum balance held on the card.

⁴⁷ A major advantage the smart chip offers over the magnetic stripe is increased security.

⁴⁸ Proton is a brand of e-purses issued by Banksys through participating banks in Belgium. It uses the Proton Prisma technology, which is also available internationally to other payment providers for licensing through Proton World initiative. Proton World was established when American Express, Banksys, ERG, Interpay and Visa International took over the international Proton business from Banksys in 1998. (See <http://www.protonworld.com>, accessed March 15, 2005.)

⁴⁹ Some authors (e.g., Böhle and Krueger (2001)) classify cards linked to prepaid virtual accounts as prepaid dedicated accounts. However, Carat (2002) describes dedicated accounts as schemes, which work only with registered merchants and are independent of existing (traditional) payment methods.

⁵⁰ I.e., the cards of recognized associations like Visa, MasterCard or American Express

⁵¹ These cards access prepaid accounts with special features. For example, one of the applications of the Visa Prepaid Card might be a Visa Buxx card issued by Bank of America. The funds can be added to the card from two different funding accounts at a time (e.g., a credit card and a checking account). Maintenance, funding and other fees are deducted from the outstanding balance. Outstanding balances on the Visa Buxx card are not FDIC insured, which is common to other prepaid debit cards (issued in the US)

Prepaid debit cards have many applications, as replacements for travelers checks and gift certificates, prepaid healthcare cards, payroll cards and “pocket money” cards for minors.⁵²

Examples of such schemes would be American Express TravelFunds Card,⁵³ MasterCard Prepaid Card (and its modifications like APS’ Access by QuickPay! card)⁵⁴ and Visa Prepaid Card⁵⁵ (and its modifications like Visa Buxx, Visa Payroll and Visa TravelMoney issued by authorized banks and payment providers).⁵⁶

4.3.2 Prepaid dedicated accounts

Prepaid dedicated accounts were primarily designed for micro-payments on the Internet. Carat (2002) describes dedicated accounts as instruments that are accepted only by registered merchants, do not allow person-to-person transfers and do not rely on traditional payment methods, such as credit cards or checking accounts. Considering the existing schemes, the last feature might be misleading;⁵⁷ therefore, it will not be strictly applied as a criterion. Prepaid dedicated accounts will instead be classified as small-value prepaid schemes mostly used for online purchases at registered merchant sites.

as well.

⁵² Prepaid debit cards need to be distinguished from so called “prepaid credit cards” (or “secured credit cards”) offered to consumers with a problematic credit history (and thus a limited opportunity of obtaining a regular credit card). From a technical perspective, secured credit cards are identical with regular credit cards. What differentiates them is the fact that the user deposits funds up to the amount of the available credit line as a collateral.

⁵³ In March 2005, the cards ordered through the American Express official website were shipped to U.S. addresses only. However, American Express has branches and partners all over world, thus the product might be available elsewhere in the future. Customers can currently choose between balances in U.S. Dollars, Euros and Sterling. More information can be found at <http://www.americanexpress.com/cards> (accessed March 16, 2005).

⁵⁴ The Access by QuickPay! card is available to U.S. customers only. More information can be found at <http://www.apsnet.com/Pages/products.htm> (accessed March 16, 2005). On its official website, MasterCard only lists U.S. issuers of MasterCard Prepaid Card modifications (http://www.mastercard.com/aboutourcards/prepaid_cards.html, accessed March 16, 2005).

⁵⁵ Not to be confused with Visa Cash smart card (<http://www.international.visa.com/ps/products/vcash>, accessed March 16, 2005).

⁵⁶ Visa Buxx and Visa Payroll are issued by participating banks to U.S. consumers only. The TravelMoney card is available worldwide through Travelex/Interpayment branches and partners. Other modifications of Visa Prepaid Card are available through participating banks outside the US. More information can be found at <http://usa.visa.com/personal/cards> (accessed March 16, 2005).

⁵⁷ See, for example, BitPass’ funding options.

Typically, users have one of the several options of funding their accounts stored on a remote server. They can buy a voucher with a unique code that they enter into the system (on the payment provider's site) that raises the account balance by a fixed amount determined by the card purchased. The vouchers can be purchased in retail outlets (e.g., convenience stores and supermarkets), in the form of scratch cards, or online, in the form of "e-mail vouchers" (i.e. messages with secret codes). Some schemes use primarily virtual vouchers exploiting the high penetration of traditional instruments among some target customer groups.⁵⁸ The virtual vouchers are purchased on the payment provider's websites and instantly used for an account refill. Other funding options are, for example, calling or sending an SMS⁵⁹ message to a premium-rate (audiotex-service) number or depositing funds through terminals at participating retail outlets.

The "refill" vouchers are usually of a relatively small value, but they can be combined. Major advantages of prepaid dedicated accounts are that they do not require any additional hardware installation on the user's side, enable convenient micro-payments for online content and allow anonymous payments without a necessity of submitting credit card details or a bank account number.⁶⁰

Examples of such schemes are BitPass (USA,⁶¹ <http://www.bitpass.com>, accessed March 16, 2005), Paysafecard (Austria and Germany, <http://www.paysafecard.com>, accessed March 16, 2005), Splash Plastic (UK, <http://www.splashplastic.com>, accessed March 14, 2005), or WWWBon (the Netherlands, <http://www.wwwbon.nl>, accessed March 14, 2005).⁶²

⁵⁸ The value proposition of these schemes is based on enabling more flexible payments of some kind; typically micro-payments for online content.

⁵⁹ SMS stands for Short Message Service.

⁶⁰ Anonymity is perceived as an advantage by users, but not necessarily by regulators or police. A potential threat might be the anonymous payment for illicit contents. Although anonymity is seemingly inconsistent with the credit/debit card funding option, it can be present to some extent. For example, the dedicated account provider can use a trusted third party processor of credit card payments, thus never obtaining the consumer's card details.

⁶¹ BitPass, Inc. is a California-based company, but Internet users worldwide can sign-up for the service provided they possess Internet-enabled credit/debit cards (Visa, MasterCard, Discover, American Express) or they have a PayPal account (as of March 16, 2005).

⁶² Other similar systems emerged in different countries due to their relatively low initial investment requirements. However, many of them did not appear to be viable due to business and regulatory difficulties. For example, in the Czech Republic several such schemes were launched but closed down.

4.3.3 Person-to-person online payment services

P2Ps are payment services that enable transfers of funds among users' virtual accounts, traditional bank accounts and credit card accounts. Their distinctive feature is the availability of two-way transfer, especially between the virtual accounts. The person-to-person functionality can be also characterized by the fact that P2Ps do not differentiate between merchants and customers. Both groups have essentially the same types of accounts, although the two groups differ in how they use the available functions and special features.

P2P systems are functionally⁶³ similar to traditional bank accounts. What distinguishes them⁶⁴ is that (1) they might be offered by non-banks; (2) they rely on the Internet for both transaction processing and account management; and (3) they ultimately rely on traditional accounts for feeding, clearing and settlement purposes.

P2Ps are sometimes treated as a subgroup of so-called VACs (virtual wallets, accounts and channeling systems). Systems based on virtual wallets (facilitating traditional forms of payment) or channeling systems (directly conveying a payment instruction to the bank on behalf of the user) that do not also provide a (prepaid) virtual account are excluded from this analysis. On the other hand, it is common for a P2P to combine the VAC functions.

The prepaid functionality can be described as follows:

Registered users use traditional payment instruments such as credit cards or bank accounts to load funds into their virtual accounts. When a user decides to "send money" from the virtual account to an e-mail address, the system automatically generates and sends a notification about the intended payment to the e-mail address. If the recipient of the notification is also a registered user, he can accept the payment after logging into his account. If the recipient is not a registered user, but still willing to receive the payment,

Monetka.cz resumed its service in 2004 after a two year gap and in a restricted form that only offers payments at websites maintained by the provider's (Computer Press, a. s.) subsidiaries.

⁶³ This is not to say that P2P accounts are generally similar to traditional current accounts. They are fundamentally different due to the fact that they are based on prepaid value and cannot provide money on credit.

⁶⁴ See Carat (2002).

he is asked to sign up for the service. P2Ps became widely used on the Internet with the growth of online auctions and the resulting need for secure and flexible online payments. P2Ps also play a role of descendants to the traditional person-to-person money orders.

Examples of such schemes are MiniTix (<http://www.minitix.com>, accessed March 16, 2005),⁶⁵ Moneybookers (<http://www.moneybookers.com>, accessed March 17, 2005),⁶⁶ FastPay (<http://www.fastpay.co.uk>, accessed February 21, 2005),⁶⁷ Nochex (<http://www.nochex.com>, accessed March 21, 2005),⁶⁸ PayPal (<http://www.paypal.com>, accessed March 17, 2005)⁶⁹ and Way2Pay (<http://www.way2pay.nl>, accessed March 16, 2005).⁷⁰

4.3.4 Mobile customer accounts

Despite the differences mentioned in Section 3.3.4, most m-payment systems have a similar transaction structure (Krueger, 2001). First, a connection between the customer and the payment intermediary is established using voice channel, SMS or USSD⁷¹ (either the customer contacts intermediary, the merchant requests the intermediary to contact the customer or the merchant forwards the customer to the intermediary), the customer authorizes the payment, usually using a PIN code. After the transaction is successfully

⁶⁵ MiniTix is provided by Rabobank Group. The service is only available in Dutch to the residents of The Netherlands.

⁶⁶ Moneybookers is a UK-based, non-bank payment provider. It has received an ELMI license from FSA (FSA Register Number 214225, see also Section 7.2.3.1). In March 2005, Moneybookers was available to residents of 30 countries (<http://www.moneybookers.com/app/help.pl?s=fees>, accessed March 21, 2005).

⁶⁷ FastPay is provided by National Westminster Bank Plc (NatWest), which has obtained permission to issue electronic money from FSA (FSA Register Number 21878). The service is only available to UK domiciles.

⁶⁸ Nochex is provided by Nochex Ltd, which is certified as a Small E-money Issuer by the FSA. The service is only available to UK residents.

⁶⁹ PayPal Inc. is a California-based non-bank payment provider acquired by eBay (a major online-auction site) in October 2002. Its subsidiary PayPal (Europe) Ltd. has obtained an ELMI license from FSA. (See Section 7.5 for more information on PayPal's regulation.) In March 2005, PayPal was available to customers in 44 countries (PayPal, 2005).

For further information on eBay, see, for example, Hill (2003). For updated company financial information, see Nasdaq:EBAY at <http://www.morningstar.com> (accessed March 17, 2005).

⁷⁰ Way2Pay is provided by ING Bank N.V. The service is only available in Dutch to the residents of The Netherlands.

⁷¹ USSD is an abbreviation for Unstructured Supplementary Service Data.

processed, the payment intermediary sends both the customer and the merchant a payment confirmation.

Merchants usually receive the money to their bank accounts. For customers, there are more funding options depending on the particular scheme. Payment providers exploiting the mobile wallet concepts would usually debit the customer's bank or credit/debit card accounts. Operators can alternatively bill the customers at the end of the month together with their communication traffic charges or debit their customers' prepaid accounts.

Prepaid accounts are the focus of this thesis. They can be either (phone) prepaid airtime accounts or special separate (virtual) accounts established for a particular payment application (service). Thus, for the purpose of this text, two types of mobile customer accounts are distinguished:

- 1) mobile virtual accounts; and
- 2) prepaid airtime accounts.

4.3.4.1 Mobile virtual accounts

Mobile virtual accounts are accounts created by a payment service provider (often a telecom) that can be loaded using traditional instruments (e.g., bank accounts or credit/debit cards) and consequently used for making payments at merchant sites which support the service.⁷²

Mobile virtual accounts are applied in unattended POS schemes, e.g., in payments for parking service. Other examples of such schemes would be OKO Bank's Digiraha (Finland, <http://www.digiraha.net>, accessed March 17, 2005), Postbank's M-bankieren (the Netherlands, <http://www.postbank.nl>, accessed March 16, 2005),⁷³ Contopronto's

⁷² Mobile virtual accounts primarily use mobile devices (especially phones), other than that they are similar to prepaid dedicated accounts.

⁷³ M-bankieren is a mobile banking service for Postbank account holders. However, the users can also use an associated mobile virtual account, which is why it is mentioned here.

LUUP (<http://www.luup.com/Corporate/Product.aspx>, accessed March 16, 2005) and Sonera Shopper (Finland, <http://www.sonera.fi>, accessed February 10, 2005).⁷⁴

4.3.4.2 *Prepaid airtime accounts*

Prepaid airtime accounts were originally created as single purpose prepaid accounts used for data transfer charges. However, many mobile communication network providers have opened their systems to third party merchants and content providers. These initiatives overlap with ex-post billing, since both groups of customers (“prepaid” and “postpaid”) are offered an access to the same services; only the time structure of the payment that differs.⁷⁵ At least two existing schemes exploiting prepaid airtime charges can be distinguished:

- 1) premium-rate services (PRS); and
- 2) services debiting prepaid airtime accounts as prepaid dedicated accounts (usually for payments for Internet content distributed through HTML and WAP platforms).

The first scheme enables a customer to make purchases by routing the purchasing call or SMS message (which will be the more likely the case for flexible small-value payments carried on a mobile phone) through a premium-rate number. The cost of the call covers both the data transport (traffic charge by the operator) and the payment for goods or services purchased (including a payment intermediation charge). Since routing through several networks might occur, the revenue from the caller is often divided between various parties to the transaction. The cost of the call is usually deducted from the remaining airtime balance in the real time.

Some of the practical applications of PRS are interactive voting, competitions (in mass media), consumer contests or marketing promotions. The payment related applications

⁷⁴ It is notable that several smaller specialized European companies that had been developing their payment platforms for a number of years went out of business in 2004. According to the official announcement of the defunct Association of E-money Institutions in the Netherlands, the major reason was the large mobile operator’s successful lobbying for their own non-compliance eliminating the opportunity for the small companies (Association of E-money Institutions in the Netherlands, 2004).

⁷⁵ Apparently, customers who are billed at the end of the billing period are granted an interest-free credit for the purchases by the operator. So far, the customers using prepaid accounts are not compensated for their disadvantage.

are, for example, vending-machine payments, payments for Internet content and payments for m-commerce content (e.g., for logos, melodies and Java applets). Some schemes are out of focus of this paper since they are not offered to consumers, but rather to the event organizers, service providers, etc.

Premium-rate services are also available to callers using landline phones. However, landline users are usually billed ex-post, therefore the audiotex services they may use are out of scope of this work.⁷⁶

The services of the second scheme of mobile payments exploit using airtime charges to pay directly for non-telephone items purchased from third parties. They are principally similar to prepaid dedicated accounts described in Section 4.3.2, with the exception that they apply the charges towards the airtime account.

An example of how they could work (from the user's perspective) can be described in several steps:

- 1) an existing mobile-network subscriber signs up for the service;
- 2) he chooses goods or service offered (online) by a merchant registered with the operator;
- 3) as the method of payment he selects a payment from his airtime account;
- 4) he is redirected to the operator's payment portal, signs in and confirms the transaction;
- 5) the amount is deducted from the customer's airtime account; and
- 6) he is sent a confirmation SMS message.

⁷⁶ There are certainly prepaid accounts associated with landlines, but even then, the usage of premium rate services on these accounts is likely to be insignificant. Furthermore, if the goods/service that the charge applies to is consumed instantly (e.g., during the call), it is highly questionable whether it should involve an e-money transaction, regardless of whether the audiotex service is paid for from a prepaid account or not.

The merchant could be paid at the end of a specified time and be charged a fee for the payment intermediation. The brief description above omits the security and verification procedures, and the settlement and other back-office operations.

The schemes of the second group are also suited for small-value transactions. The target customers might be particularly users without bank accounts or credit cards. An example of such a service is m-Platba of T-Mobile, Czech Republic (<http://www.t-mobile.cz>, accessed March 17, 2005).⁷⁷

⁷⁷ The example was chosen for its suitable features.

5 Recent trends and future prospects

Payment schemes based on electronic prepaid instruments described in Section 4.3 have gone through many changes recently and so have the expectations concerning their future. The aim of this chapter is to provide a brief overview of the recent trends, map the current situation (although some aspects can be only inferred from the past or estimated) and finally suggest some future prospects.

The sizes of individual sections of this chapter vary, which partly reflects the disparate developments and the perceived importance of different schemes. Whereas one scheme might be a subject of lively discussions, as it precipitately develops, raising many questions, another might only slowly progress. More or less space is given to particular schemes depending on their range of functions, perceived potential and current position in their respective segments of the payments market.

5.1 Electronic purses

As it was mentioned, most smart cards enable service providers to combine several applications on one microchip. Smart chips are expected to eventually replace magnetic stripes on payment cards. This process has already begun, but has not been as swift as originally assumed. Many professionals believe smart cards will present an important trend in payment despite their “slow start”. Recent developments in proximity payments in the USA and increasing deployment of EMV standard in Europe also indicate the rising momentum of smart cards.

An installation of a special terminal at the merchant sites is required to use smart-card electronic purses. This combined with other aspects (some of them are described in Section 6.3) have created a “chicken-and-egg” problem of achieving critical mass, that have proved a major barrier to the adoption of many card-based e-money schemes so far.

Merchants perceive the cost of installing special terminals (or replacing the old ones with their newer versions compatible with certain smart-card technology) to be substantial considering a low penetration of prepaid cards among customers. On the other hand, customers do not see a compelling reason for using the schemes because of the low level of acceptance by merchants.

To foster the growth of card-based e-money systems, several initiatives promoting compatibility and interoperability have been launched by organizations involved in e-purse payments provision (scheme providers, certification authorities, card issuers, fund issuers, merchant acquirers, payment processors etc.).

EMV standard of EMVCo LLC⁷⁸ (formed by Europay, MasterCard and Visa in 1999) was developed to manage common specifications in the smart cards area. It defines the terminal and integrated circuit card (ICC) procedures necessary to effect payment transactions in an international interchange environment. The EEP (European Electronic Purse) initiative of the European Committee for Banking Standards⁷⁹ introduced a model, which allows the EMV specification to be used to create an e-purse scheme operating in multiple currencies (stored on separate slots) and enabling offline purchase and purchase cancellation transactions and online load and currency exchange.

Based on EMV and EEP, CEPSCO⁸⁰ developed the CEPS (Common Electronic Purse Specification) set of standards, which defines technical specifications and the roles and responsibilities of parties involved in e-purse transactions. The Ducato project of Banksys, Europay International, Interpay, Proton World International, Sistema 4B, Sermepa and Visa EU was the first implementation of CEPS.

According to ECB (2002) there were 25 different card-based e-money schemes in operation in Europe in 2002. Most of them were operated by financial institutions. For a few years, there have been high expectations of the proliferation of card-based schemes. Despite several successful applications in Europe,⁸¹ the expectations have not been met to date.

ECB (2004) presents that card-based e-money transactions accounted for only 0.7% of the total volume of all EU non-cash payments in 2001. They were most popular in

⁷⁸ See <http://www.emvco.com> (accessed March 17, 2005).

⁷⁹ See <http://www.ecbs.org> for updates (accessed March 17, 2005).

⁸⁰ See <http://www.cepsco.com> (accessed February 14, 2005).

⁸¹ For example, Chipknip number of payments grew by respectable 272% to 81.1 million in 2002. Interpay (2003) identified the primary cause of transaction growth to be an increase of unattended POS (e.g., parking meters and vending machines). In 2002, a total of 325,000 of Chipknip cards were purchased by resellers (the cards are distributed through retail merchants).

Belgium (7.0%) and Luxembourg (5.3%). In terms of aggregate volume of all transactions, e-purses comprised about 2.4% of the total volume of credit/debit card payments.⁸² Fed (2002) suggests that the U.S. payment volumes of emerging payments including e-purses were quite small in 2000, although the collected data was limited (mostly due to the reluctance of the payment providers to reveal reliable information).⁸³

It is tricky to predict how the market for electronic purses will shape up in the future. The financial institutions in Europe and the USA seem to be serious in their standardization efforts and increasing deployment of smart cards. However, the proliferation of smart cards and the implementation of the stored-value principle have not been as smooth as projected. Broader deployment of smart-card technology also does not necessarily imply an increase in the usage of e-purses (smart cards can be used for credit/debit card applications with more advanced authentication technology over the magnetic stripe).

Arguably, the mag-stripe principle will eventually be replaced by chip, but it may take time. It is reasonable to expect a broader scope of payment functions going hand-in-hand with this trend, although the direct link to e-purses development cannot be made. If smart cards succeed to proliferate, it is likely that they will incorporate multiple functions, not just an e-purse. Among other uses, they could replace various identification cards, passports or membership cards by a single device. This of course requires a great deal of standardization and coordination efforts. Smart cards could also revive in a new shape, as suggested by recent developments in proximity payments⁸⁴ based on contact-less chip technology.⁸⁵ (Proximity payments are usually considered a subset of mobile payments discussed in Section 5.5.)

⁸² The volume of transactions seems to be more appropriate measure of multipurpose prepaid card usage. The aggregate value of transactions might be misleading due to the fact that they are used for low-value transactions. Selected data is reproduced in Table 10.5 and Table 10.6 in the Appendix.

⁸³ At the same time, no indications of notable e-purse projects were found by this author.

⁸⁴ Proximity payments are generally face-to-face payments that are enabled through short-range wireless technology, such as Bluetooth, RFID, infrared, and contact-less chip. (RFID is Radio Frequency Identification, an expanding technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electro magnetic spectrum to uniquely identify an object, animal, or person. RFID has various applications in different fields.)

⁸⁵ For example, MasterCard has been testing its PayPass card for several years, and according to MasterCard (2005) is starting its deployment in cooperation with partners. According Visa USA (2005b), Visa is also operationally ready to deploy its contact-less technology (Visa Contactless). Both standards use cards incorporating a hidden embedded computer chip and antennae that are used to transmit payment

5.2 Prepaid debit cards

In the case of prepaid debit cards, a lack of reliable statistical data is complicated by the fact that none of the comparative statistical outputs reviewed by the author recognized the prepaid feature per se. Statistical reports covering card payments other than those based on e-money usually classify transactions by card association, credit and debit functions, online and offline use, routing and settlement method, etc.

Very limited data is available from organizations issuing prepaid debit cards. According to Visa USA (2003), quoting The Nilson Report, credit, debit and stored-value card transactions in the USA are expected to surpass cash and checks combined in 2009. Furthermore, Visa USA states that prepaid card volume⁸⁶ in the USA grew year-on-year on average by 110% in the four quarters ending March 2003, and the year-on-year growth of prepaid card volume in 2004 was 112%. Visa prepaid card volume is expected to exceed \$50 billion in 3 to 5 years.⁸⁷

According to Nilson Report (2003), balances of \$250 million were sold as card replacements for travelers checks in 2002.⁸⁸ A growth by 50% was projected for 2003. Nilson Report (2004) also projects a growth of Flexible Spending Account prepaid healthcare cards payment volume to more than \$855 million in 2004.⁸⁹ MasterCard recognizes the expanding potential for prepaid cards and integrates these schemes into MasterCard RPPS initiatives.⁹⁰

details wirelessly. This way, the customer does not need to hand the card to the merchant to swipe it. The card/terminal interaction of both platforms is based on the MasterCard PayPass ISO/IEC 14443 Implementation Specification. For more information, see <http://www.paypass.com> (accessed March 18, 2005).

⁸⁶ The total volume means the aggregate value of card payments. Within the Nilson Report methodology, “transaction” is used in a different sense.

⁸⁷ According to Nilson Report (2003), the total volume of card payments in the USA was \$2,332.19 billion in 2002. The projected figure for 2007 is \$3,840.3 billion. In terms of total volume, Visa is the biggest payment card association in the USA (about 42%). The total Visa E.U. cardholder expenditure over one year ending September 2004 was €919.3 billion (Visa EU, 2005).

⁸⁸ According to Nilson Report (2003), the worldwide travelers check sales totaled \$31.79 billion in 2002.

⁸⁹ There were 1.7 million prepaid healthcare cards in circulation in the USA in 2003. MasterCard’s 510,000 prepaid cards (tied to Flexible Spending Accounts) generated over \$284 million in purchase volume in 2003.

⁹⁰ See MasterCard Remote Payment and Presentment Service at <http://www.mastercardintl.com/rpps> (accessed March 18, 2005). For a practical implementation, see, for example, APS’ “Access by QuickPay!”

The prepaid debit cards (as they were described) are apparently bound to the traditional POS technology used for credit/debit cards. Thus, the discussions around them have not focused on technical features, but on the popularity of the prepaid principle. At a conference organized by FRB of Philadelphia (2003b), T. Jack Williams supported his claim that prepaid debit cards will continue to grow by pointing to the trends in some consumer sub-sectors, e.g., consumers with problematic credit history or minors. The prepaid principle is generally gaining popularity among teenagers. Prepaid debit cards have also enjoyed increasing popularity as more flexible replacements for gift certificates and travelers checks.

The mentioned trends were also recognized by the Unisys (2003) U.S. retail payment study participants.⁹¹ Majority of them believed that gift cards and payroll cards, which can be used like debit cards, will be the primary stored-value market in the USA. Especially gift card usage was expected to grow significantly. Most bank representatives interviewed in the survey either offered or planned to offer Visa- and MasterCard-branded gift cards. About half of the interviewed merchants said they would be offering prepaid debit cards by the end of 2003.

5.3 Prepaid dedicated accounts

Prepaid dedicated accounts present a new alternative to micro-payments after the failure of digital cash. Although both the value and volume of transactions based on prepaid dedicated accounts is negligible relatively to the total value and volume of consumer payments, some of the new schemes are gaining popularity.

5.3.1 Vouchers as a transitory solution

Chege (2002) looks at prepaid dedicated accounts from a different perspective and stresses their potential in markets with a relatively low penetration of credit/debit cards. He focuses on Africa, but apparently, the conclusions might be valid for other parts of the world including some European countries. Chege (2002) identifies beneficial features like

card at <http://www.apsnet.com> (accessed March 18, 2005).

⁹¹ The group of participants consisted of various retail payment market stakeholders on both supply and demand sides (commercial banks, payment system intermediaries, networks and service providers, technology vendors, retail consumers, high-volume retail bill originators and national retail merchants).

independence from bank accounts and credit cards, safety, no special technological requirements on the user's side and familiarity.⁹²

Although his argument is reasonable, it is necessary to point out that voucher-scheme models based on insufficient proliferation or the inflexibility of other instruments have very limited medium-term growth potential. Particularly unsustainable features are the reliance on physical retail outlets and, most of all, the revenue model based on "leakage".⁹³

5.3.2 Micro-payments for digital content

Services designed for digital content micro-payments show that the mentioned negative features are not characteristic to all dedicated-account schemes. Micro-payments for digital content became interesting after the failure of "free" (advertising funded) model in many areas of online publishing. The unsustainability of free content created a demand for cost-effective methods of small-value payments.

Micro-payment services based on prepaid dedicated accounts are seen as potential business enablers for companies that were not able to conduct business under the "old" setup of payment options. Guy Kawasaki⁹⁴ quoted in Business Wire (2003) expressed his enthusiasm about one of the service providers, saying, "BitPass is the most exiting opportunity I've seen since the Macintosh" (significant statement despite Mr. Kawasaki's partial interest in the business).

Some authors suggest that Internet users might witness an emergence of new content markets if efficient ways of micro-payments enable greater divisibility of the content. The

⁹² Prepaid accounts enjoy great popularity in consumer telecommunication services in some parts of Africa. See, for example, product offers of South African Telkom (<http://www.telkom.co.za>, accessed March 10, 2005), MTN (<http://www.mtn.co.za>, accessed March 10, 2005), CellC (<http://www.cellc.co.za>, accessed March 10, 2005) and Vodacom (<http://www.vodacom.co.za>, accessed March 10, 2005).

⁹³ The "leakage" model applied by some providers is based on revenues from unused and unredeemed expired balances on the dedicated accounts. This happens when consumers lose or damage the purchased vouchers, or let their balance expire because it is not sufficient or usable for any purchases they might want to make.

⁹⁴ Guy Kawasaki is a writer, columnist, cofounder of Apple Computer and the CEO of Garage Technology Ventures. He is also a board director of BitPass. Garage Technology Ventures is one of the venture capital investors of BitPass. Apparently, the expressed opinion cannot be perceived as unbiased. Still, Guy Kawasaki's involvement in BitPass is notable considering he is a respected author and entrepreneur.

consumers might be able to buy a single piece of “quality” information that is so far only available to professionals willing to pay high subscription charges for the whole complex (or bundle) of products and services.⁹⁵

It is not clear to what extent this emergence is occurring. According to Online Publishers Association (2004), U.S. consumers spent \$853 million for online content in the first two quarters of 2004, which represented an increase of 14% over the same period the previous year. On the other hand, subscriptions accounted for 90% of the content, indicating that the share for single-purchase payments was minimal. At the same time the percentage of consumers purchasing online content seems to be leveling out at around 11% in contrast with a high growth in the past.

Online Publishers Association (2003) shows that within the category of single purchase payments, micro-payments (under \$5) grew steadily from 2.6% of the total value in the first quarter of 2002 to 7.7% a year later. However, Online Publishers Association (2004) shows that the share did not grow significantly from 2003 to 2004. Micro-payments remained a significant portion of single-purchase revenue in the “general news”⁹⁶ category, but overall most single-purchase payments fall in the \$5–\$49 bracket. Under current conditions, the growth potential of micro-payments seems limited.

The prevalence of higher-amount Internet payments could be explained by the unsuitability of credit/debit cards for small-value transactions. Their direct use does not represent a good micro-payment alternative due to relatively high per-transaction costs, security issues and the inconvenience of entering the cardholder identification.

Proprietary subscription schemes form an alternative to services based on prepaid dedicated accounts. Their disadvantage is their requirement on the consumer to maintain numerous customer (log-in) accounts. Many proprietary subscription schemes also do not enable a single purchase. They rather encourage the consumer to buy the whole “package”, which he does not necessarily need.⁹⁷

⁹⁵ See, for example, Greg Papadopoulos (2004) or Boston Globe Staff (2004).

⁹⁶ “General news” category included sites like CNN.com, NYTimes.com and USAToday.com.

⁹⁷ This package can mean an unlimited access to a particular content for a period of time, a bundle of items related to the one purchased, extra subscriptions to other provider’s services etc.

In spite of these relative disadvantages, there are sophisticated proprietary payment solutions (provided by specialized technology designers) that have been very successful. They have exploited the potential of separate adjustable system modules that can be customized and combined to fulfill the complex requirements of big content providers.⁹⁸ The above-mentioned figures also clearly indicate the current dominance of subscription schemes in the real world.

According to Forrester Research,⁹⁹ sales of digital content in the UK doubled in 2003. Forrester Research predicted that European sales of MP3 music files alone would exceed \$1 billion by 2007. New marketing approaches enabled by micro-billing can be observed. For example, Internet users have been offered new music singles launched solely online.

The outlook for micro-payments seemed more optimistic in 2004. Although micro-payment services using prepaid dedicated accounts may have a good potential and certainly can be justified theoretically, the current market conditions are not very favorable as far as their broader utilization is concerned.

5.4 Person-to-person online payment services

Electronic mail has dramatically changed communications. The prevalence of e-mail in today's society (in developed countries) together with a demand for more efficient ways of transferring value among individuals have been a main driving force behind the emergence of P2P payments. A growth of P2Ps has been observed in two major areas: online auctions and cross-border personal transfers. These trends are not necessarily independent, since Internet buyers can make cross-border purchases. Furthermore, P2Ps have allowed virtually anyone to accept payments for non-sale purposes, such as donations.

⁹⁸ For example, Yaga (<http://www.yaga.com>, accessed March 19, 2005) provides complex payment and digital rights management solutions for one-time purchases, bundling, discounts, gifts, promotions, special offers for defined user groups, recurring subscription, pay-per-access, pay-per-download, pay-per-click, timed and velocity (number of uses) passes etc.

⁹⁹ Quoted in Budden (2003)

5.4.1 Online auctions

In online-auction payments, P2Ps address the practical difficulties of using traditional instruments for long-distance transactions among anonymous parties, particularly among buyers and small (or part-time) merchants, for whom the transaction costs related to the direct acceptance of credit/debit cards might be prohibitive. The potential for P2Ps is higher in the so-called “check countries” (typically the USA and the UK) compared to the “giro countries” with established efficient retail banking tools (e.g., Scandinavian countries).

At the beginning of 2005, the worldwide P2P market leader was PayPal (owned by eBay Inc.). According to eBay (2005), it had 63.8 million accounts at the end of 2004. The number of active accounts¹⁰⁰ increased year-on-year by 53% to 20.2 million in the last quarter of 2004. The total payment volume was \$5.6 billion in the fourth quarter of 2003, an increase of 51% year-on-year.¹⁰¹

According to Nilson Report (2004), out of the total of \$12.2 billion of PayPal’s payment volume in 2003, \$8.2 billion (67%) was linked to online-auction transactions (primarily on eBay). The volume of payments from U.S. sources represented \$10.2 billion of the 2003 total, \$5.61 billion (55%) came from Visa, MasterCard, America Express and Discover credit and debit cards,¹⁰² the rest through the ACH Network.¹⁰³

If the potential of P2Ps is seen in the light of the growth of online auctions, it is quite promising. The number of active users of eBay,¹⁰⁴ the world’s biggest auction site,

¹⁰⁰ Active accounts are accounts whose user sent or received at least one payment during the quarter.

¹⁰¹ In the fourth quarter of 2004, the transaction revenue rate was 3.57%, transaction processing expense rate 1.27% and transaction loss rate 0.31%.

¹⁰² Credit/debit card-funded transactions are considered to be potentially harmful for the PayPal, because (after deducting the credit-card processors’ fees) they provide low margins for PayPal. Consumers in some countries (e.g., US) tend to prefer credit-card funding to the ACH (even if they do not need a credit) due to a greater legal consumer protection and dispute ability.

¹⁰³ PayPal uses Wells Fargo Bank N.A. for card-payments settlement and as a gateway to the ACH.

¹⁰⁴ Active users are registered users who bid, bought or listed an item at least once in the previous year (eBay, 2005).

increased over 2004 by 36% to 56.1 billion. The gross merchandise sales in 2004 totaled \$34.2 billion, up 44% from the previous year.¹⁰⁵ (eBay (2004) and eBay (2005))

5.4.2 Cross-border payments

The market potential for retail electronic cross-border payments is enormous. According to Boston Consulting Group quoted in Selby (2002), retail cross-border payments in 1998 accounted for \$142 billion within Europe, \$41 billion in the Americas and \$32 billion in Asia. (The complete matrix can be found in Table 10.12 in Appendix.) Global cross-border payments have been growing and are expected to grow significantly in upcoming years.¹⁰⁶

The usage of traditional instruments like checks and bank money orders (credit transfers) is still costly and slow.¹⁰⁷ The usage of credit/debit cards is conditioned by one of the two parties being a registered acquirer (business). In this respect, P2P payments represent a viable, cost-effective alternative. The transfer fees are smaller (or nil) and transfers can be instant (when funded from prepaid balances or registered bank accounts).

According to Bank of Thailand (2002), the inefficiencies in cross-border retail payment systems originate at both the inter-bank and intra-bank levels and stem from (1) the low volumes of cross-border retail payments compared to the domestic payments; (2) the predominant use of correspondent banking arrangements involving many intermediaries instead of using a single payment infrastructure; (3) the longer execution times compared to domestic payments; and finally (4) the lack of standardization and automation at the inter-bank and intra-bank levels.

¹⁰⁵ According to eBay (2005b), eBay Inc. operated auctions in 32 markets worldwide as of December 31, 2004. Most of its net revenues in the four quarters of 2004 came from U.S. sources (60%, 58%, 58% and 55% respectively).

¹⁰⁶ Boston Consulting Group Global Payments 2000/1 report quoted in Taylor (2001).

¹⁰⁷ Mailing a check can take over a week and its depositing in a foreign country is usually connected with a percentage fee. Wire transfers take several days, and their initiation and receipt are connected with charges that are prohibitive for small amounts. For example, as of February 2005, an initiation of a wire transfer from the USA to the Czech Republic is likely to cost the consumer between \$15 and \$30 (author's estimate based on different media sources and selected U.S. banks' price lists). Furthermore, the Czech bank is likely to charge the recipient a percentage of the amount (e.g., CSOB: 1%, min. CZK 150, max. CZK 1000).

Selby (2003) identified the price umbrella for emerging P2Ps in Europe, mentioning that in January 2002 a cross-border (bank) money transfer of €100 cost on average €17 and took over three days to settle. The situation has improved for euro-denominated payments with the implementation of the Single Euro Payments Area. Selby (2003) also recognized the potential in the relatively high number of Internet users and low penetration of P2Ps. He admitted that traditional payment providers were best positioned to dominate the European cross-border market. At the same time, they had the most to lose if they would not react flexibly to consumer needs.

5.4.3 Potential barriers to growth of P2Ps

Despite the optimistic prospects, the growth of P2P schemes might be inhibited. Cheung and Arber (2004) identify four major problematic areas as the lack of interoperability, customer registration, regulatory environments and security issues.

As far as the interoperability is concerned, P2Ps lack interoperability and are entirely proprietary in the beginning of 2005. A customer of one service cannot pay a customer of another service, unless they both open an account with the same provider.

The customer registration problem has two dimensions. First, the attention span of Internet users while waiting to be signed-in is estimated to be about 7 to 30 seconds. This creates a crucial requirement for swift log-in process. Second, the “viral nature”¹⁰⁸ of P2Ps can only be only exploited if the registration process is fast and trouble-free. If potential users need to wait more than a week for authorization before they can start transacting, they might loose interest.

The regulatory framework can prevent growth and innovation by requiring tedious “know-your-customer” procedures. In such an environment, it might be extremely hard for start-ups to come up with solutions flexibly reacting to the market needs.

The security concerns can be divided into two areas: transaction-level security and user authentication. The first one relates to protection of sensitive payment details during

¹⁰⁸ When a registered user sends money to an unregistered user, the later one is required to sign-in to be able to redeem the money.

transfer and it can be addressed by encryption in SSL.¹⁰⁹ So far, the authentication part has been more complicated. Although technically feasible, a dual-factor strong authentication is not established and its acceptance by users might be difficult.

5.4.4 Future prospects of P2Ps

TowerGroup (2002) makes an interesting point arguing that P2Ps cannot be perceived as stand-alone instruments. They should be rather viewed as a part of a solution mix reaching beyond the pure P2P market.

Indeed, from what the Internet users might have observed, the P2P providers have been broadening the scope of the services they supply. These trends can be seen in the tools that P2P providers offer (e.g., debit cards to the prepaid accounts, money market funds or other interest-bearing accounts¹¹⁰ and various complex merchant tools)¹¹¹ and in new applications and functionality. The motivation behind these efforts is the necessity to generate the fee income crucial for a viable business.

Facing the new multipurpose schemes, traditional retail financial intermediaries might need to pay attention and assess the impact of dynamic changes on their position.

5.5 Mobile customer accounts

Recent technological developments enabled the creation of handheld mobile devices that can be used for a much greater scope of applications than just pure voice communication and text messaging. Multimedia content and interactive programs are available for small

¹⁰⁹ SSL is Secure Socket Layer, a protocol for secured data communication. SSL is now widely used on the Internet.

¹¹⁰ This is where the distinction between P2Ps and banks merges. However, there are differences. The interest-bearing accounts do not have to be necessarily provided by the P2P itself. The transfer of a balance into such an account can be thus viewed as an additional tool or a function. On the other hand, some P2Ps have been built as subsidiaries of banks. In this case, talking about a P2P seems to be useless, because the P2P functions could be supposedly considered as a mere adjustment of the bank's existing product range. Such a view however, is simplified, at least from the regulatory perspective. If some of the P2P activities are considered as issuing e-money, then they certainly cannot be confused with a pure provision of an alternative delivery channel for traditional services etc.

¹¹¹ The core idea of the P2P is that the customers and merchants are not distinguished in a way that they are provided the same basic instruments. The potential "deficit" of customization for the needs of users that specialize most of the time on the role of either a merchant or a customer is addressed by additional tools and features, which can be activated for the accounts.

compact phones. With improved functionality, the concept of a personal trusted device becomes more important.¹¹²

The distinction of mobile schemes might be confusing. Some payment providers tend to call their own services “mobile” even when they only use mobile technology as an additional distribution channel. In such cases, the mobile phone (or a PDA) is used to access an Internet site or reach a voice service line.¹¹³

5.5.1 M-payments’ value proposition

Mobile phones’ opportunity in the field of payment is seen in the embedded SIM (smart) card they use to store authentication information of users. The advantage of not needing to use other devices (e.g., POS terminals, modems and card readers) for mobile payments is also quite clear.

However, what may not be clear is the value proposition of mobile payment solutions. In fact, the value proposition for both merchants and customers varies in different service-domain applications. Whereas it is realistic that mobile payment services improve unattended POS and Internet payments, Faber et al. (2003) say their superiority to payment cards in attended POS transactions is not convincing so far.

5.5.2 M-commerce and prepaid principle

The potential for mobile payments is based on the high penetration of mobile phones in the developed countries.¹¹⁴ From the perspective of mobile customer accounts, particularly important are the numbers of prepaid subscribers. According to EMC reproduced in ePayNews,¹¹⁵ the number of prepaid users was supposed to double between 2001 and 2004 surpassing 800 million worldwide. Payment providers are reacting to the

¹¹² See, for example, MeT mobile wallet concept in MeT (2003).

¹¹³ For example, Moneybookers claims that it provides a worldwide mobile payment solution. In fact, the phone number is only used for identification and notification purposes. The transactions are initiated through an automated voice service line. (<http://www.moneybookers.com>, accessed March 3, 2005)

¹¹⁴ Estimated average penetration in Western Europe is 84% with some countries’ penetration over 90%. Precise, more detailed statistics are not publicly available. For basic information, see, for example, <http://www.cellular.co.za/stats/stats-main.htm> (accessed March 19, 2005).

¹¹⁵ ePayNews Statistics are available at <http://www.epaynews.com/statistics/mcommstats.html> (accessed March 19, 2005).

increased popularity of prepaid principles. For example, MasterCard acknowledges the trend in launching its rePower program.¹¹⁶

Predictions of m-commerce revenues vary to the extent that it is problematic to make reasonable conclusions.¹¹⁷ However, it can be observed that the supply of m-commerce content is on the rise. Analysys Research quoted in Online Publishing News (2002) estimated that 37% of all mobile traffic (translating into revenues of €44 billion) will be non-voice by 2007. Mobile payment schemes are considered to be well positioned in the market since customers are accustomed to paying for m-commerce content.¹¹⁸

5.5.3 Dominant m-payment transaction models

As far as different transaction models (described in Section 4.3.4) are concerned, the near future m-payment market is likely to be dominated by applications based on prepaid airtime accounts.

Yet again, specific publicly accessible data is not available. However, based on this author's consultations with representatives of technology-providing firms, most efforts focus on finding innovative ways of using airtime accounts, as opposed to building separate systems. In this manner, originally single-purpose prepaid accounts held at telecoms are turning into multipurpose payment instruments as communication networks open to third party merchants.

It has been mentioned that prepaid initiatives often overlap with the postpaid ones, simply because one payment system is offered to all customers of an operator regardless of their payment relationship with the operator.

¹¹⁶ MasterCard rePower is a payment service that provides cardholders with a more convenient way to reload prepaid accounts (e.g., phone airtime) using their MasterCard debit or credit card. For more information see <http://www.mastercardrepower.com> (accessed March 19, 2005).

¹¹⁷ CNN.com (2003) quoted Ovum estimating the money spent globally for phone accouterments (logos, ring tones etc.) to be \$1.6 billion in 2002. Ovum projected global m-commerce revenues of \$37 billion in 2006. Forrester Research 2001 estimates can be found in Table 10.14 in the Appendix.

¹¹⁸ This contrasts with the "free" provision of Internet content.

5.5.4 Changing role of telecoms

Krueger (2001) comes up with important considerations concerning the changing nature of services delivered by mobile operators. With m-commerce development, the role of telecoms is transforming from data transit providers (commodity sellers) to specialized and personalized services providers. In the new environment, the customer relationship management (CRM) and quality of service (QoS)¹¹⁹ are gaining crucial importance.

Telecoms are facing new challenges in the service provision and delivery. Briefly, “voice roaming” is supplemented by “data roaming”, “service roaming” and “payment roaming”. Telecoms need to be able to charge their own customers in other networks and charge other networks’ customers for their services as well as services of third parties.¹²⁰ From the wholesale perspective, telecoms need to establish revenue sharing models that correspond to the increasing interdependence.¹²¹

Other challenges can be imposed by country-specific legal frameworks. Hypothetically, if national tax laws required the service providers to charge and submit taxes according to the location of the customer, the mobile operators would need to be able to gather and process the relevant information.

Telecoms might also need to revise their risk management approach as their position changes dramatically with the introduction of third-party services. When a telecom only provides its own services (with nearly zero marginal costs), fraudulent behavior (i.e., unpaid usage) merely does not contribute to revenues. However, if the telecom guarantees payments to third parties, fraudulent behavior creates actual additional costs for the operator. Krueger (2001) suggests that telecoms will need to perform some typical banking tasks.

Finally, mobile operators need to adapt their processes to the concept of a “one-way network”. An example of a “two-way network” is the voice network where anyone can call anyone else. In the one-way network, participants are differentiated. In many existing

¹¹⁹ Billing systems need to be able to measure the quality of services provided, and the content delivered and adjust charges accordingly.

¹²⁰ Different payment roaming scenarios are discussed in Chapter 5 of GSM MoU Association (2001).

¹²¹ More information on implications of payment provision for telecoms’ mutual relations can be found in Chapter 6.2 of Krueger (2001).

electronic payment systems, one class of participants only receives payments (merchants) and a different class of participants only makes payments (customers).¹²²

5.5.5 Common platforms and standards in m-payment

Current mobile payment solutions are often characterized by local, non-interoperable, proprietary features. To change the situation joint ventures of credit card associations, network operators, banks, merchants and technology providers have been cooperating on various mobile payment schemes. Cross-industry alliances have formed to create common platforms and foster growth.

Mobile Payment Forum (MPF) was founded to promote standardized, secure and authenticated mobile payments. In March 2004, MPF's board members were 3 (formerly Hutchinson 3G), American Express, JCB, MasterCard, Nokia, NTT DoCoMo, Orange, TIM, T-Mobile, Visa and Vodafone.¹²³

Four large European mobile operators, Orange, Telefónica Móviles, T-Mobile and Vodafone launched the Mobile Payment Services Association (MPSA) in February 2003. In June 2003, MPSA was renamed to Simpay. Its standardization efforts concentrate on defining interface specifications and messaging formats. The objective is to establish an open mobile payment system that would work across borders and participating mobile networks. The motivation that drives the telecoms' cooperation efforts is the removal of barriers to greater expansion of mobile (intermediated) services.¹²⁴

The new aspect about the Simpay's approach to mobile payment is the proposal of a hybrid system that tries to leverage the strengths of both banks and telecoms. In the Simpay's concept, a small-value payment (typically a payment for mobile content and vending machine purchases) would be charged against customer airtime account (which can be also prepaid), whereas a higher-value purchase would be charged to a traditional

¹²² One person or institution could have the merchant and customer status at the same time. However, such a person is treated within the system as two separate participants. For many existing schemes (credit/debit cards) this "dual status" is uncommon.

¹²³ The total number of members was 89 on March 21, 2002 according to a last available update in a form of a press release. More information can be found at <http://www.mobilepaymentforum.org/members.htm> (accessed March 19, 2005).

¹²⁴ A parallel with SMS is often quoted. The real surge in text-messaging was conditioned by the customer's ability to send/receive messages to/from all networks, regardless of the provider.

instrument, such as credit card. Thus, for higher-value purchases, the payment scheme would exploit the mobile wallet concept.¹²⁵ In February 2005, two more mobile operators, Amena and Proximus, joined Simpay. Simpay plans a commercial launch of its interoperable mobile payment platform in Spain, the UK and Belgium in 2005, followed by introduction in other European countries in 2006.¹²⁶

5.5.6 Current m-payment applications

Payments for mobile content (graphics, melodies etc.) seem to be more widespread than POS transactions in the beginning of 2005. On the other hand, promising “real” implementation, such as vending machines and parking applications,¹²⁷ start to emerge as well.

Online Publishing News (2003) projected the increased development of mobile proximity payments (MPPs). MPPs allow customers to use their mobile phones more conveniently for payments for goods and services in retail outlets as well as vending machines. The feature that distinguishes new systems from the majority of existing schemes (e.g., PRS payments for vending machine purchases) is the direct communication between the POS device and the mobile phone.¹²⁸

5.5.7 Future prospects of m-payments

Costello (2003) is pessimistic as far as the near-future replacement of plastic cards by mobile devices is concerned. He identifies the huge investments into existing retail payment network as well as the complex system of trust relationships in current electronic payments as main barriers to plastic cards replacement.

¹²⁵ Mobile wallets are out of scope of this thesis, because they are not prepaid instruments. Their functionality is similar to e-wallets, but they use mobile phones as delivery channels. Examples of mobile wallets are Mobipay (<http://www.mobipay.com>, accessed March 19, 2005) and Vodafone m-pay (<http://mpay-cards.vodafone.co.uk/html/home.html>, accessed March 10, 2005).

¹²⁶ Updated information is available at <http://www.simpay.com> (accessed March 19, 2005).

¹²⁷ Various mobile solutions enabling flexible payment for parking have been functioning in cities across Europe for several years. A discussion of pros and cons of different concepts as well as case studies can be found in Dahlström (2002).

¹²⁸ An example of a practical application can be the Near Field Communication enabled Nokia NFC shell for Nokia 3220 phones (Nokia, 2005).

Nonetheless, he suggests that mobile payments might substitute a part of common bill and coin payments. It is true that to a certain extent so-called “machine-to-machine” wireless payments have been successfully deployed in many areas (e.g., highway tolls, transport tickets, car washes and vending machines). Costello (2003) predicted that also further developments in the payments for mobile content were inevitable in the near future. Mobile devices might be used in micro-payments for Internet content as well.

M2 Presswire (2003) quotes BWCS report¹²⁹ predicting an expansion of mobile proximity payments at the real POS in the next few years. The boost of MPPs will be supplemented by growing micro-payments for mobile content. According to BWCS, mobile phones are going to converge to trusted transaction tools.

Martha Bennett, a Forrester Research analyst, does not share the optimistic views on mobile payments.¹³⁰ At the GigaWorld conference in Paris in 2003, she identified some serious business and technical barriers to m-payments broader acceptance. According to Bennett, m-payment transaction costs might be prohibitive, especially in the case of mobile wallets, because both a card (interchange) fee and mobile operator fee apply. She adds that phones themselves may not be sufficiently reliable as they sometimes crash and require signal coverage. In this light, Bennett raises the question of m-payments’ competitiveness compared with cash, cards and merchants’ proprietary systems.

As described, the opinions on the future of m-payments vary. However, it seems reasonable to conclude that mobile payments will continue to evolve. So far, developments in payments for mobile content appear more straightforward than those in real POS applications. BWCS estimates that by 2010 Japan will remain the largest market for MPP services, generating \$93 billion in transactions. The USA is expected to be the second largest market. High growth of MMP in Europe is predicted as well.

¹²⁹ Parsons, R., 2003. *Mobile Proximity Payment Services*. BWCS (<http://www.bwcs.com>).

¹³⁰ Saran (2003)

Further m-payment development greatly depends on the successful standardization and cooperation efforts. The potential use of mobile devices for higher-value payments is conditioned by the establishment of solid security, risk management and dispute management practices.

6 Transition to innovative payment instruments

Many innovative retail payment schemes have faced serious problems during their trial implementation. Particularly, replacing cash and introducing instruments more suitable for distant e-commerce payments have appeared troublesome. This chapter takes a more theoretical approach to e-money and prepaid instruments.

First, it raises the question of what is truly new about e-money. Then, it puts the development of e-money schemes into a broader perspective of payment systems evolution and the process of innovation itself. Following a brief look at the recent e-commerce payment systems, several conceptual barriers to adoption of innovative payment instruments are identified. The aim is to provide a broader framework for understanding specific developments described elsewhere in this thesis, or alternatively, to expand the base for analysis.

6.1 Innovative features of e-money in the perspective of payment systems evolution

Krueger (2002) argues that there have been many innovations in retail payments over the last few decades. Online authorization of credit card transactions was introduced, debit cards have become widely used, single-purpose prepaid cards (accounts) were launched by numerous providers (particularly telecommunication operators) and credit transfers and direct debits replaced paper checks in many countries. However, none of these innovations raised as much attention as the launch of e-money schemes.

The wide public was excited and regulators worried about potential implications of e-money on the financial system. Krueger (2002) identifies five crucial factors contributing to the excitement surrounding the original theoretical concept of electronic money:

- 1) e-money was prepaid and thus enabled person-to-person transfers without an involvement of a third party provider (a bank) during the transaction;
- 2) e-money enabled anonymous electronic payments;

- 3) card-based e-money promised a potential use in both real and virtual world (through card readers connected to the computer); and
- 4) e-money was issued by non-banks, the new players in the financial intermediation that were expected to bring down the rigidities in the existing system.

Although the original vision of e-money as a liquid, internationally accepted electronic representation of cash is appealing, it has never been fully realized.

The e-money landscape as it has shaped up looks quite different from the original concepts. Today, card-based e-money is mostly issued by banks and software-based e-money is virtually non-existent. All schemes are account-based. Complete anonymity is present at only a few systems that are not dominant (e.g., scratch-card loaded dedicated accounts). The vast majority of card-based schemes do not allow offline person-to-person transfers or direct re-spending of received e-money. Card-based e-money products cannot be used for cross-border payments.

It is possible to argue that electronic purses today resemble debit cards more than the original concept of e-money. The difference is the prepaid value. Some advantages can be higher speed, lower operational costs and lower counterparty risk for the payee. However, offline¹³¹ transactions require more complex technical and operational risk management. E-purses can increase speed and convenience of the payment, but they also incur switching costs to merchants. Following the decreasing costs of online connection, it is not obvious if the offline approach prevails in the field of card-based e-money. A comparison of important features of e-purses and credit/debit cards is in Table 6.1.

¹³¹ In this case, “offline” describes a transaction without an online authorization of the issuer. For example, a real POS transaction can be either online or offline.

Table 6.1**Main features of various card schemes**

	Online author.	Prepaid	Chip	PIN	Anonym. 1)	Credit risk	Fraud risk incl. lost/stolen
E-purse	No	Yes	Yes	Possible	Yes	No	I, CH
Debit card	Possible	Possible	Possible	Possible	No	Possible 2)	online: I, CH; offline: M, I, A
Credit card	Possible	Possible	Possible	Possible	No	Yes	card present: I, A, C; MO/TO: M

Notes:

I: issuer, M: merchant, A: acquirer, CH: card holder; MO/TO: mail order/telephone order

1) vis-à-vis merchant (This covers only the payment information. If the consumer provides a name and shipment address, anonymity is not given.)

2) if there is an automatic overdraft

Source: Krueger (2002)

To recap, e-money can be hardly seen as an electronic equivalent to cash. Rather, existing e-money products today can be viewed as instruments that are anonymous and free of credit risk, that can potentially be used offline, and that can combine payments with other financial services.

6.2 “Gloomy scenery”

Before starting the discussion of possible barriers to adoption of innovative payment instruments, it might be useful to briefly look at the existing payment landscape. The humble prevalence of card-based e-money (mostly used at the real POS) has been already discussed in Section 5.1. What is the situation on the Internet?

The digital cash is virtually non-existent. Some hopes have been placed into other innovative schemes, which could increase the effectiveness of Internet payments. Several services do thrive, however, looking at statistical data, the new instruments still lag behind the traditional ones.

As Böhle and Krueger (2001) argue, credit cards are the most important payment instrument on the Internet. The statistical data for the year 1999 that they use can be found in Table 10.1 in Appendix. It shows that credit cards are more popular in the United States (78% of transactions) compared to Western Europe (42%).

The dominance of credit cards in Internet purchases is also in accordance with newer sources. Table 10.2 contrasts the payment-related desires of top 25 Internet merchants with the actual payment methods used in 2002. Credit cards accounted for 84% of transactions. Haizheng Li and Han Zhang (2004) provide a closer look at online auction payments at eBay concluding that 72% of them are rendered using credit cards.¹³²

From the above-mentioned observations, it may seem that consumers are rather comfortable using credit cards for online payments. However, UCLA CPP (2003) surveyed Internet purchasers in 2002 and found 63.3% of them “very or extremely concerned” when using their credit cards online and another 29.1% “somewhat” concerned.¹³³ Table 10.3 in the Appendix shows that security concerns and the inconvenience of entering the information (name, address, card number) are the two most important factors that discourage U.S. consumers from using credit cards online.

Credit cards seem to be far from an ideal payment instrument for the Internet. This should not be surprising, because they were originally designed for face-to-face transactions. Despite the great (and to some extent successful) efforts of issuers and credit card associations to improve the security of credit cards, they remain very vulnerable to fraud. Credit card payments are also quite expensive¹³⁴ and cannot be used for person-to-person payments.

Innovative prepaid payment instruments have clear advantages.¹³⁵ Security can be easier maintained using encryption (and/or virtual accounts), the payment processes are fully automated and features fitting the needs of e-commerce (like P2P functionality) can be established. The question then is, “What has held back their adoption?”

¹³² They indicate that majority of credit card transactions (61.54% of total number of payments) are processed through PayPal. However, considering the vast involvement of credit cards in the transactions, it is likely that sellers use PayPal’s virtual POS service and buyers its virtual wallet function.

¹³³ This does not imply that credit card users feel necessarily significantly safer when paying at a real POS, as it can be observed from Table 10.4 in the Appendix.

¹³⁴ For description of interchange fees and their distribution see McArthur and Richard (2002). Some (older) cost estimations can be found in Chakravorti and To (1999). Overall disadvantages of credit cards in e-commerce transactions are expressed in Anthony Hayes’ perspective in “The consumer side of e-payments” panel debate in Sienkiewicz and Bochicchio (2002).

¹³⁵ However, the legal consumer protection might not be in favor of the new schemes. Further discussion of the consumer protection issues in the United States (particularly the comparison of credit cards and other payment methods) can be found in Mann (2003).

6.3 Barriers to adoption of innovative payment instruments

The focus of this section is electronic money, but the broader implications related to the character of payment systems are applicable to prepaid schemes as well. One barrier to adoption not discussed in this section is legal and regulatory uncertainty. More on this subject can be found in Chapter 7.

6.3.1 Network effect

First of the possible explanations of limited use of e-money systems today might lie in the character of payment systems in general. Spencer (2001) suggests that money is an example of a network good. In other words, its effectiveness depends on the number of consumers using it. A key element is the “general usage” in the definition of money.

As a network good, money produces a positive consumption externality, and thus it tends to be underprovided by the market. Network goods are similar to public goods in a way that a consumption of an individual does not result in a reduction of the good available for others. Moreover, the consumption by a new individual entering the market increases the usefulness to others.

The network effect of money has some important practical implications. The chicken-and-egg problem in the adoption of new payment schemes was mentioned in Section 5.1, but new payment systems face other problems as well.

The problem of reaching a critical mass is explained by the reluctance of people to use new schemes until a sufficient relative number of their associates use them. This issue appeared even before the emergence of e-money schemes during the first launch of credit cards.

Here, a brief look into the history can be instructive. Take, for example, BankAmericard, the predecessor of the Visa card was introduced by the Bank of America in 1958. The unsolicited cards were originally mailed to 60,000 customers in Fresno, California. In the event, later known as the “Fresno Drop”, Bank of America lost \$8.8 million, a huge

amount at the time.¹³⁶ The credit card, the most successful financial product ever created, was clearly considered a failure during its first launch.

Krueger (2002) describes the slow start of payment schemes before they reach a critical mass as a “non-linear spread of innovation”. The non-linear spread of innovation, often described by an S-shaped curve,¹³⁷ makes it more difficult to interpret current developments. The explanation of the S-shape curve is in the spread of information. Similar conclusions can be derived using the technology adoption life cycle described later in this chapter. Krueger (2002) provides a good practical example in the analysis of the spread of ATMs in Germany in the 1980s and 1990s. The data is reproduced in Graph 10.1 in the Appendix.

Spencer (2001) adds other precarious aspects related to the network effect. Payment schemes tend to create natural monopolies, because they involve a great portion of duplication for potential newcomers. It is difficult to convince customers to switch providers especially if they are not particularly dissatisfied with the systems they have been using. Providers might be also reluctant to adapt innovations once they have invested into existing schemes.

6.3.2 Effect of convenience goods

Continuing in the search for the reasons of low proliferation of e-money, Spencer (2001) suggests that money can be view as a convenience good. It means that money is not desired for its own sake but to access other goods and services. This has two important implications.

First, the price elasticity of demand for money is low. If the cost of transactions increases, users do not significantly reduce their demand. The principle also applies to payment instruments. Users have strong incentives to be reluctant to changing the instruments due to previously mentioned natural monopoly tendencies of providers and high switching costs. The low price elasticity distinguishes money from most other network goods.

¹³⁶ Vartanian (2000)

¹³⁷ Krueger (2002) referring to Freeman, C.: Diffusion: the spread of new technology to firms, sectors, and nations, In: Arnold Heertje (ed.), *Innovation, technology, and finance*. Oxford: Basil Blackwell, 1988, pp.38–70; and Wehinger, G.: Bargeldinnovationen und ihre geldpolitischen Konsequenzen,

Second, since money is not demanded for its own sake, it is desirable that money is multifunctional. Nonetheless, the first generation of e-money was comprised of schemes designed for one particular application or environment, e.g., digital cash for the Internet and e-purses for micro-payments at the real POS. Unfortunately for the first generation of new e-money instruments, users appeared to prefer multifunctional schemes that do not impose any switching costs. The price they were willing to pay was the higher transaction costs.¹³⁸ An important factor influencing their choice was also the credit card issuers' guarantee of misuse coverage.

6.3.3 Comfort factor

Behavioral patterns in the transfer of money are important determinants of the acceptance of new payment instruments. Vartanian (2000) describes the "emotional attachment" of people to "their money". People get comfortable with the way they pay and are reluctant to adapt their habits unless the cost, convenience and confidence factors of existing payment methods change dramatically. Yet again, it can be observed from the history that even with clearly useful payment products, the adoption might take a relatively long time due to the strong conservative preferences of many potential users.

6.3.4 Effect of discontinuous innovations

In his famous book, Moore (2002) distinguishes continuous and discontinuous innovations in the consumer adoption of new products. Whereas continuous innovations refer to pure upgrading (without a requirement for a change in the consumer's behavior), discontinuous innovations require a change of the consumer behavioral patterns.

Most of the new payment instruments fall in the category of discontinuous innovations, which makes their adoption particularly difficult. The lessons from the high technology field can be that (1) the transition period (to new instruments) might be relatively long; and that (2) a special attention needs to be given to the specific marketing¹³⁹ approaches (e.g., Moore's technology adoption life cycle) to prevent faulty expectations about innovations.

In: Österreichische Nationalbank, Berichte und Studien 1/1997, pp.60–76.

¹³⁸ Ibid.

6.3.5 Confidence

Trust and confidence are essential for all payment instruments. At the same time, Vartanian (2000) argues that governments and related organizations are vital in building trust among consumers and businesses. Users are primarily looking for payment instruments that will be surely accepted in the future and expect the payment systems to handle transactions without delays or disturbances.

However, the majority of payment system innovations are introduced by the private sector, which creates an additional need for establishing a sufficient level of confidence. A possible solution might be an active participation of governments in the adoption of the new payment systems. For example, if a government required the usage of smart cards by those who receive some kind of financial assistance from the public budget, smart card technology would become soon marketable for other purposes as well. Vartanian (2000) concludes that a successful introduction of new payment services requires a unique mix of governmental, business and consumer incentives.

6.4 Outlook of payment systems innovation

Although the payment innovation as it was described might be quite complex, the concepts presented do not imply that it is condemned. For example, FRB of Philadelphia (2003) conducted a survey among corporate end users, technology firms, non-bank service providers, payment processors, banks, infrastructure providers, and other organizations, which showed no “systemic” barriers to payment system innovation in the USA. Nevertheless, the survey has confirmed that there are many challenges and came up with various specific recommendations.

¹³⁹ Here, the word “marketing” refers to market research, not just promotion or advertising.

7 Regulation of e-money and stored value products

The prospects that new payment schemes might be widely used raise policy and regulatory questions. Most central banks are interested in the potential effects of innovative payment instruments on financial stability. Although it may appear that the impacts are insignificant, the regulatory bodies still try to monitor the evolution of the market. The aim of this chapter is to discuss the major policy issues, to provide a brief overview of existing legislation in the EU and the USA and to compare the two approaches to regulation.

New legislation can be designed as a response to the existing systems or it can try to define a broad general framework in some field. Regardless of which of these approaches is used, the regulatory response necessarily lags behind the most recent developments. This can be seen in the retail payment systems area as well.

7.1 General overview of policy and regulatory issues related to the retail payment systems development

7.1.1 Policy debates

Allen (2003) discusses several key questions related to policy debates around e-payments. The first area of interest is interoperability. To date, the interoperability between various new payment services has been insignificant. This raises the question of whether a public intervention into the market processes could result in gains for all participants. For example, gaining a critical mass would be easier for new entrants under a common infrastructure. The opponents of such interventions state that public involvement can constrain the natural development and threaten spontaneous innovations.

Another major policy issue is the consumer protection. The question is, whether regulatory authorities should play an active role in the creation of security measures, risk management practices, etc. Payment service providers are primarily interested in maintaining security to protect themselves against fraud and resulting losses, but inadequate security can cause market-wide negative externalities. In the worst-case

scenario, failures in some market segments could reduce the public's confidence in the wider electronic payments market.

It is not imaginable that regulation could entirely disappear with the technological advances in payments. The new trends in the payment intermediation (e.g., globalization and deregulation) raise questions whether the traditional approach to financial sector regulation is adequate, but leave little doubt that the main motivation behind interventions remains. The driving forces behind regulation are consumer protection, promotion of competition and stability and finally soundness of the financial system.

According to Nieto (2001), the goal of the consumer (and investor) protection is to achieve equity in the distribution of information. The regulatory focus at the macro level has been traditionally the transparent and reliable advertising by financial intermediaries ensuring a correct dissemination of information among market players. At the micro level, Nieto (2001) sees non-discrimination in relations between intermediaries and consumers as a major goal. Regulators of G10 countries have recently promoted broader disclosure to allow greater counterparty surveillance in the financial transactions.

Besides the traditional aspects of financial services regulation, the progress in information technology creates new challenges for regulators, namely those related to the security, data privacy and globalization of the financial services provision. New challenges are posed by the proliferation of Internet-only banks and non-bank payment service providers.

7.1.2 Systemic considerations

The progress in technology can potentially call the banks' exclusive role in the payment system into question. Non-banks can provide payment services without the direct involvement of traditional depository institutions. As a result, the regulators face new challenges related to the systemic safety net.¹⁴⁰ First, the technology allowing the separation of payment and credit services can weaken the influence of ex-post regulatory

¹⁴⁰ A safety net is generally a complex of rules and regulations aimed to protect consumers (deposit insurance) and financial institutions (lender of last resort) against the consequences of actions beyond their control.

interventions in preventing a systemic problem. Second, new deposit substitutes¹⁴¹ by non-banks may cause a confusion related to the extent of the safety net. Furthermore, a potential extension of the safety net to cover them might increase the moral hazard associated with deposit guarantees. Finally, increasing concerns about systemic risks are raised by the expansion of unregulated outsourced technological infrastructures shared by a number of financial institutions.

From a slightly different perspective, Allen (2003) identifies two main areas of interest associated with the financial system stability.¹⁴² The first area of interest is concerned with the transactions moving outside existing payment systems. The proliferation of emerging payment services can lead to new institutions (possibly outside the financial services industry) managing a large volume (and value) of transactions on their books. Previously, these transactions would be settled through existing payment systems, where relevant security and risk management issues have been established.

The second area of interest is represented by the impact the new payment systems could have on the traditional ones. Those new schemes that rely on traditional instruments have the potential to threaten the reputation of both types of schemes. In other words, should a major failure occur, the failing scheme could implicate the traditional instrument it relies on. New schemes could also change the usage of traditional instruments (e.g., by increasing the number of aggregation arrangements), imposing potential operational risks on them.

7.1.3 Need for new regulatory models

The progress in technology and the globalization of financial services provision have created new requirements for prudent regulation and supervision. These trends make the traditional categories of financial intermediaries obsolete. Nieto (2001) identified a regulatory goal as “minimizing moral hazard while, at the same time, securing technological neutrality and desirable market innovation” (p.97).

¹⁴¹ These substitutes are non-bank deposits that are usually not covered by deposit insurance, e.g., accounts held at P2Ps, mutual funds (allowing a checking function) and brokerage firms.

¹⁴² Interest in these areas and their suggested monitoring does not necessarily imply that the systemic risks will increase with the proliferation of innovative payment schemes.

The new landscape of financial services seems to require regulatory and supervisory models based on objectives (e.g., stability, transparency, competition and innovation), rather than types of financial intermediaries. In this respect, the aim is to provide uniform regulation for different institutions involved in the same activities.

7.1.4 Finding the relevant legislation

The problem of supervisory models is linked to the question, whether small-scale emerging services should be regulated. The answer differs across regions. For example, some of the differences in the regulatory approaches of the EU and the USA are contrasted in Section 7.4.1.

Due to the changing nature of retail electronic payments, it is not always clear what regulation should apply and which applications meet the regulatory criteria. For example, the EU regulatory framework, as defined by EP (2000), mostly suits card-based and software-based e-money schemes. The legislative interpretations concerning other prepaid systems can be quite complex within the EU framework.

Sometimes, a practical motivation behind treating certain prepaid systems as e-money is that they might otherwise end up unregulated. Although it cannot be understood as a binding universal interpretation (each country can freely choose its regulatory approach), UK's Financial Services Authority (FSA) suggested a practically motivated guidance on the scope of e-money regulation summarized in Table 7.1.

Table 7.1

The FSA guidance on the scope of e-money regulation

E-payments method	Regulated as e-money in the UK?
Account-based e-payments services (prepaid)	Probably, if it can be spent with a merchant; probably not if only for person-to-person money transmission
Mobile phone payments: access to existing payment means	No
Mobile phone payments: premium-rate services (PRS)	No, unless it involves the acceptance by third parties of prepaid airtime as a means of payment
Mobile phone payments: prepaid airtime	See mobile phone payments PRS above
Mobile phone payments: postpaid (e.g., ex-post billing)	No
Prepaid cards/network tokens (“traditional e-money”, e-purses)	Yes

Source: Allen (2003), based on Appendix 3 in FSA (2001)

7.2 E-money regulation in the EU

This section briefly summarizes the legislation related to the concept and issuance of e-money in the EU. First, a quick look at the early developments before the creation of E-money Directives is provided. The following section summarizes the contents of the Directives and mentions their potential flaws.

The overview of the EU regulation is concluded by a brief note about implementation of the E-money Directives. It is, however, out of scope of this thesis to present a survey on the status of E-money Directives adoption in the 25 Member States.¹⁴³

7.2.1 Early history of e-money regulatory considerations in the EU

When the first e-money schemes started to be used by the public (although the usage was not significant), European regulatory and legislative institutions perceived a need to create a general regulatory framework for such developments. Originally, the European

¹⁴³ The latest “comprehensive” document covering the subject is CPSS (2001). It only briefly mentions the legal issues in different countries and it is out of date.

Monetary Institute (EMI, 1994) suggested that e-money should be only issued by traditional credit institutions (mostly banks).

The European Commission reacted with the first draft of the Electronic Money Institutions (ELMI) Directive (EC, 1998), motivated by concerns about the impact of the EMI's "strict" regulatory approach on innovation and competition in the e-money issuance.

The European Commission especially stressed the potential of e-money to provide cheaper cross-border payments and support monetary integration. In the meantime, the Commission also issued Recommendation 97/489/EC "concerning transactions by electronic payment instruments and in particular the relationship between issuer and holder".¹⁴⁴

ECB (1998) opposed the ELMI Directive draft by suggesting that e-money issuance should be limited to (traditional) credit institutions, as the institutional framework and monetary policy procedures for them already exist. Based on an identified set of regulatory concerns,¹⁴⁵ ECB (1998) presented minimum requirements and two desirable objectives for e-money issuance.¹⁴⁶

ECB was sympathetic to the opinion that it was necessary to regulate e-money even before it proliferated. Although the potential systemic losses were minimal at the time, ECB argued that postponing regulation could generate problems and costs in the future as e-money issuers would be forced to adapt to newly established systemic rules. In its later

¹⁴⁴ EC (1997), Section I, Article 2 distinguishes two types electronic payment instruments: (1) remote access payment instrument (an instrument enabling a holder to access funds on his/her account at an institution, e.g., a payment card, phone- or home-banking application) and (2) electronic money instrument ("a reloadable payment instrument other than a remote access payment instrument, whether stored-value card or computer memory, on which value units are stored electronically").

¹⁴⁵ The main areas of concern were the monetary policy, efficiency and confidence in payment instruments, customer protection, stability of financial markets, protection against criminal abuse and market failures.

¹⁴⁶ The minimum requirements were prudential supervision, solid and transparent legal arrangements, adequate technical, organizational and procedural security measures, protection against criminal abuse, monetary statistics reporting, redeemability at par value and possibility for central banks to impose reserve requirements. The desirable objectives were the interoperability (to avoid an "unnecessary duplication of investment" (ECB, 1998, p.27)) and issuer insolvency protection arrangements (guarantee, insurance or loss-sharing schemes).

approach towards the ELMI Directive proposal, ECB demanded vast restrictions of (future) electronic money institutions.

7.2.2 E-money Directives

In September 2000, two directives on e-money were adopted:¹⁴⁷

- 1) the ELMI Directive¹⁴⁸ (the Directive 2000/46/EC of the European Parliament and of the Council of 18 September 2000 on the taking up, pursuit of and prudential supervision of the business of electronic money institutions); and
- 2) the Directive 2000/28/EC¹⁴⁹ of the European Parliament and of the Council of 18 September 2000 amending Directive 2000/12/EC¹⁵⁰ relating to the taking up and pursuit of the business of credit institutions.

The E-money Directives had multiple objectives. The first objective was to grant a single “EU passport”¹⁵¹ for e-money issuers. The E-money Directives introduce a set of harmonized prudential rules that should be adopted by national regulators. By implementing these requirements, the national regulators would be allowed to authorize and supervise e-money issuers that could consequently enter the whole market of the EU without the necessity of authorization in other countries. This approach is based on the rules referred to as the principle of “home country control” and the principle of “mutual recognition”. It is noteworthy that the authorization requirement implies that third-country schemes are not allowed to remotely issue e-money in the EU.

Other objectives of e-money legislation are the customer protection (through a prudential framework aimed to safeguard the financial integrity and stability of ELMIs and through

¹⁴⁷ As a subset of payment mechanisms, e-money services might be also influenced by the Regulation (EC) No 2560/2001 (EP, 2001) on cross-border payments in euro and by the related Single Euro Payments Area initiatives. Obviously, other legal arrangements also apply.

¹⁴⁸ EP (2000)

¹⁴⁹ EP (2000c)

¹⁵⁰ EP (2000b) is also called “Codified Banking Directive” as it bundles several previous directives from the field of European banking law. The Directive 2000/28/EC essentially amends the Codified Banking Directive by adding ELMI to the notion of credit institution and setting rules for e-money issuance by the traditional credit institutions.

¹⁵¹ The mutual recognition principle is included in the Directive 2000/12/EC (EP, 2000b).

a redeemability requirement), the promotion of competition and finally the legal certainty enabling the development of e-commerce. The ELMIs remain subject to most of the rules set by the Directive 2000/12/EC¹⁵² and the Directive 91/308/EEC.¹⁵³

The ELMI Directive was published in the Official Journal of the European Communities on October 27, 2000. It defines electronic money (as described in Section 3.3.1) and introduces the “electronic money institution” (ELMI) as a special type of credit institution that is, however, subject to lighter regulation than banks. Particularly, the capital requirements for ELMIs are lower.

Moreover, the ELMI Directive suggests that national governments should be able to set lower standards for firms acting only within the country’s borders (so called “waiver”).¹⁵⁴ In other cases, ELMI Directive allows e-money service providers to conduct business (both remotely and through local branches) across the Member States provided they fulfill the minimum prudential requirements. Since ELMIs are subject to lighter regulation, the ELMI Directive suggests that they are bound to invest in highly liquid low-risk assets.

There have been discussions about the accuracy of the ELMI Directive. A primary matter of concern was the inclusion of the clause stating that e-money is “issued on receipt of funds of an amount not less in value than the monetary value issued” (Article 1(3)(ii) in the definition of e-money).

Critics suggest that the requirement should have been expressed in a substantive article rather than the definition. Following the existing ELMI Directive, any “e-money-like” scheme where some kind of monetary value is being created (and which can thus have an

¹⁵² ELMIs are exempted from Title V, Chapter 2 of the Directive 2000/12/EC, which covers technical instruments of prudential supervision, namely provisions concerning own funds, solvency ratio, large exposures and qualifying holdings outside the financial sector. Also Articles 51 and 59 shall not apply. (The mutual recognition arrangements provided for in Directive 2000/12/EC shall not apply to ELMI’s business activities other than the issuance of e-money. Article 2(3) states that “the receipt of funds within the meaning of Article 1(3)(b)(ii) does not constitute a deposit or other repayable funds according to Article 3 of Directive 2000/12/EC, if the funds received are immediately exchanged for electronic money”.)

¹⁵³ Council Directive of 10 June 1991 on prevention of the use of the financial system for the purpose of money laundering (Council of the European Communities (1991)). Articles 5, 11, 13, 19 and 20 shall not apply.

¹⁵⁴ Provisions of the E-money Directives can be waived in cases where: the total outstanding e-money does not normally exceed €5 million and never exceeds €6 million; or the e-money issued is only accepted by subsidiaries or parent undertakings and their subsidiaries; or the e-money issued is accepted only by limited number of undertakings. For exact requirements, see Article 8 in EP (2000).

impact on the financial system) is not covered by the definition and therefore excluded from the e-money regulation. Typically, these would be various loyalty point schemes.

The requirement of redeemability (ELMI Directive, Article 3) also caused controversy as it discriminates multipurpose schemes using prepaid value that may be only recovered in goods or services. For example, a non-redeemable prepaid dedicated account system (e.g., BitPass) would violate the ELMI Directive rules.

Other concerns are that ELMI Directive might remain an obstacle for non-banks due to its strictness and that traditional concept of e-money “stored on an electronic device” (understood as a device in the consumer’s physical possession) might not exactly (or appropriately) correspond to the newly emerging payment schemes, particularly account-based services on the Internet.

7.2.3 Implementation of the E-money Directives

The ELMI Directive was to be implemented in Member States by April 27, 2002. The ELMI Directive commits the European Commission to review its application by Member States not later than April 27, 2005. In October 2002, The Association of E-money Institutions in the Netherlands (2002) conducted a survey and found that five of the fifteen Member States (namely Belgium, Finland, France, Greece and Spain¹⁵⁵) had not yet implemented the ELMI Directive. The survey also found that there was insufficient harmonization of the prudential supervision framework for e-money.

As far as the broad legal status of ELMIs is concerned, two basic approaches can be found across the Member States. ELMIs are either viewed as a subcategory of credit institutions (e.g., Austria, Germany, the Netherlands, Portugal and Spain) or they are considered to be licensed organizations that issue a specific payment instrument, i.e. an e-money product (e.g., Denmark, Ireland, Sweden and the UK).

¹⁵⁵ According to the EU Institutions press releases (2003), the European Commission was going to send reasoned opinions to Belgium, Finland, France and Greece for failing to adopt the measures necessary to comply with the E-money Directives. (In January 2003, Spain was not in the group any more.)

From the perspective of payment instruments features, two diverging supervisory approaches were applied across the Member States: the functional approach (or logical possession approach) and the physical possession approach.¹⁵⁶

7.2.3.1 Functional approach

UK implemented the ELMI Directive into its Financial Services and Markets Act 2000 (FSMA).¹⁵⁷ FSA (2001) set out a general approach to the regulation of e-money issuers together with draft rules and guidance. The final rules and guidance are published in the FSA Handbook of Rules and Guidance (FSA Handbook).¹⁵⁸ The basic set of e-money related rules is included in the Electronic Money Sourcebook Instrument 2002 and its amendments.¹⁵⁹ As a part of the Authorization Manual, the FSA issued a block of perimeter guidance in order to clarify which activities involve e-money issuance.¹⁶⁰

FSMA (Order 2001 (SI 2001/544)) defines e-money as monetary value, as represented by a claim on the issuer, which is (1) stored on an electronic device; (2) issued on receipt of funds; and (3) accepted as a means of payment by persons other than the issuer. Notably, the words “of an amount not less in value than the monetary value issued” (in EP (2000), Article 1(3)(b)(ii)) are not included in the FSMA. They were omitted to make clear that issuing e-money at a discount is not an unregulated activity.

Paraphrasing the FSA Handbook, in addition to the e-money products usually recognized in the interpretations of the ELMI Directive, e-money products can be also individualized e-money balances accessed remotely.

¹⁵⁶ The user needs to physically possess the device on which the monetary value is stored. This approach tends to exclude remote server account-based schemes from e-money classification. As a result, such schemes are forced to one of the following: (1) redesign the scheme to match the technical regulatory requirements; (2) apply for a small-scale waiver (if available); (3) apply for an exemption from the regulation; (4) apply for a banking license; (5) group with a bank; or (6) relocate to another Member State. All of these options might be unreachable or prohibitive especially for smaller issuers and start-ups.

¹⁵⁷ For the complete text, see FSA (2000).

¹⁵⁸ FSA (2005)

¹⁵⁹ An updated version including amendments is available at <http://fsahandbook.info/FSA/handbook.jsp?doc=/handbook/ELM> (accessed March 20, 2005). FSA policy statements are available at <http://www.fsa.gov.uk/Pages/Library/Policy/Policy/index.shtml> (accessed March 21, 2005).

¹⁶⁰ Updated Authorization Manual is available at <http://fsahandbook.info/FSA/handbook.jsp?doc=/handbook/AUTH> (accessed March 20, 2005).

Incorporating the ELM Directive “waiver” (Article 8), the FSA allows three types of e-money issuers: (1) banks which have received the FSA authorization to issue e-money; (2) authorized electronic money issuers, which are subject to “full” regulatory requirements and supervision (also referred to as ELMIs);¹⁶¹ and (3) certified small e-money issuers.¹⁶²

The FSA regulation framework forms a good example of a functional approach to e-money issuance. According to the FSA Handbook (and many statements), the FSA focuses on the substance of a particular scheme when deciding whether it involves e-money. The two general considerations involve the issuance of prepaid monetary value that the holder can spend with third parties; and the provision by the issuer of some other service. In its approach, the FSA focuses on the core principle of the schemes functioning and aims to disregard artificial features of schemes that could disguise the payment function as a supply of some other kind of service.

FSA (2002b) reviews the distinction of e-money and deposits. E-money is characterized by (1) being a purely electronic product (which cannot be used by non-electronic means); (2) being intended primarily for making payments (not saving); (3) not having additional features to those necessary for pure payment facility (e.g., overdraft or direct debit); and (4) being sold as e-money (not as a deposit). These characteristics are meant to point towards an e-money scheme. They are neither ultimate nor exhaustive (as the final decision remains upon the FSA).¹⁶³

¹⁶¹ FSA Handbook sets out a broad scale of high-level standards and rules applying to ELMIs. The rules concern the areas of regulatory processes; prudential requirements; management, systems and controls; disclosure requirements, purse limits and redeemability; money laundering; compensation and complaints handling; and fees (to the regulator).

¹⁶² Small e-money issuers (who have received the small e-money issuer certificate), are not authorized and are not undertaking a regulated activity. However, they are required to report to FSA on their activities, including the total of their outstanding e-money liabilities. The waiver certificates can be granted to issuers whose total e-money liabilities do not normally exceed €5 million and never exceed €6 million; or whose e-money is accepted as a means of payment only by other members of the same group and the total liabilities do not exceed €10 million; or whose e-money is accepted by not more than 100 persons located within the same premises or other limited local area or having close financial relationship with the issuer. Small e-money issuers must also limit the storage amounts on their electronic devices to not more than €150. (The limit does not apply to merchant and distributor devices.)

¹⁶³ In this context, it is interesting to look at PayPal (Europe) Ltd., which is regulated by FSA (Register Number 226056) as an e-money issuer, has the “EU passport”, and yet provides a range of additional services with its accounts.

The position of the FSA illustrates a diligent and transparent approach to regulation, which practically resulted in payment service providers applying and obtaining the FSA license to conduct business in the EU. The first organization that became an ELMI under FSA regulation was Moneybookers. Another major P2P provider, PayPal, also obtained a license (and thus the “EU passport”) from FSA through its subsidiary PayPal (Europe) Ltd.

7.2.3.2 Physical possession approach

In contrast to the FSA functional approach, the Association of E-money Institutions in the Netherlands (2002) presents the findings of its survey among confidential sources indicating that the physical possession approach exists in some Member States.

The physical possession approach can be characterized by some of the following features:

- 1) e-money has to be stored on an electronic device in the consumer’s physical possession;
- 2) the transaction device (e.g., card, mobile phone, PC, PDA) must be at the same time the device that holds the e-money application;
- 3) the transaction device must be at the same time the device that holds the record of the e-money balance;
- 4) a remote server is not considered a device on which e-money or e-money application is stored; and
- 5) e-money services cannot be based on individualized accounts as the functioning of these is considered a deposit-taking activity.

Incorporating the concept of the physical possession into the definition of e-money can be seen in Sweden. Swedish legislators defined e-money as a claim on the issuer, which is without existing in an individualized account stored on an electronic medium and approved as a means of payment by others than the issuer.

The physical possession approach can be considered negative (for good reasons), because it is often based on misunderstanding of the first-wave type of e-money systems and it

may create barriers for adoption of new technologies. A lack of technology-neutral (i.e. functional) approach resulted in an ambiguity of e-money qualification among the Member States as well as within one Member State where some schemes might be regulated differently, although they are functionally similar.

7.2.4 New Legal Framework for Payments in the Internal Market

Recognizing the different interpretations of the ELMI Directive by the Member States, the European Commission aims to include e-money in its New Legal Framework for Payments in the Internal Market, which should be published in 2005. This should eliminate the confusion over what institutions should be regulated and how they should be regulated. In April 2005 it is still not apparent what the new approach will be. The last openly available update on the initiative (EC, 2003) outlines three possible solutions to the problem of the rights to provide payment services to the public, but new alternatives might have been considered by the Commission since.

The first suggested solution was to apply the principle of mutual recognition, meaning that an institution licensed to provide certain service in one country could offer it in other Member States as well. Without establishing a set of uniform minimum regulatory requirements this option is likely to be problematic from the legal perspective. The second solution assumed the introduction of a new specific category of licensing for payment activities. Based on the incurred risk, payment service providers would be licensed as fully-fledged credit institutions, ELMIs or institutions only providing simple money transmission services. The prudential requirements for the transmission-only services would be less strict than those for credit institutions and ELMIs. Finally, the third solution was to transform the ELMI Directive into a framework directive regulating all payment services dealing with customers' money. Under this scenario, regulatory exemptions could be granted for certain specific services.

7.3 E-money regulation in the USA

The U.S. approach to e-money contrasts with the one of the EU. From the beginning, the Federal Reserve (Fed) took a more relaxed view on e-money pointing out that early regulation might suppress innovation.

The Fed's more relaxed attitude towards e-money does not imply, however, that the regulatory interventions in the USA are minimal compared to the EU.

Böhle and Krueger (2001) mention that besides the great number of regulatory and supervisory agencies applying a broad range of very confined rules, there are also many regulators at the State and federal level. Similarly to the EU, legislators have been trying to harmonize, simplify and modernize the regulatory processes. One of the initiatives is the Uniform Money Services Act (UMSA) discussed further.

7.3.1 Multiple layers of payment services regulation in the USA

Krueger (2002b) recognizes several basic State and federal aspects of regulatory activities related to the provision of retail electronic payment services in the USA (including prepaid schemes). These aspects are discussed below starting with the ones related to the State regulation that have traditionally covered non-bank activities.

7.3.1.1 State money transmitter laws

Non-banks that offer payment services are subject to various State money transmitter laws. According to Mester (2000), 44 States regulate non-banks issuing physical stores of value (e.g., travelers checks and money orders). In some States, the regulators require 100% reserves, compliance with capital adequacy rules, licensing, bonding, and periodic examinations and audits. Sale of payment instruments and money transmission appears to be one of the most heavily regulated activities.

Some of the State regulatory requirements might cover e-money as well. In 1990s, several American States expressed their position on money transfers over the Internet. Ramasastry (2001) indicates that the State regulators mostly saw the new electronic payment instruments (including stored-value and/or e-money instruments) as equivalents to "brick and mortar" money transmission services.

7.3.1.2 State banking laws

New electronic payment products raise the question of a potential conflict with the existing State banking laws. If an institution non-chartered within the U.S. dual banking system creates a payment product linked to an account, this activity might be considered

(under the State law) as engaging in the banking business without a license. Such an activity is then likely to be illegal.

The problem of a potential conflict with the State laws has been obvious from legal actions following certain deployments of e-purse schemes and from the recent debates surrounding the status of some P2Ps.

7.3.1.3 Anti-money laundering legislation

Law enforcement agencies that are responsible, for example, for monitoring and preventing money laundering were historically particularly concerned about the development of anonymous and non-traceable payment methods.

Although such payment methods might be more difficult to monitor, in 2004 the problem of money laundering does not appear to be more serious in the case of e-money issuers than in the case of other payment providers. Digital cash is virtually non-existent and other anonymous schemes (e.g., those based on scratch-cards) remain marginal.¹⁶⁴

7.3.1.4 Federal Reserve's responsibility for the payment system

The Federal Reserve is responsible for safety and integrity of the payment system. It achieves its goals by prudent supervision of banks and by the imposition of controls on the Fedwire net settlement services. It is noteworthy, that these two measures may not necessarily extend to non-bank payment providers (e-money issuers) since the prepaid instruments might be considered liabilities of the issuer, but not bank deposits.

Mester (2000) indicated that non-bank payment providers were not new to the U.S. payment landscape (for example, American Express or Western Union have had a long history), but payments using their products had historically represented only a small portion of the total, therefore not creating a need for extensive regulation on the federal level.

¹⁶⁴ This obviously does not mean that the anti-money laundering legislation should be entirely omitted in the case of e-money. When needed, it is possible to apply additional technical measures (e.g., turnover limits, or algorithms detecting suspicious patterns of use) to prevent misuse. Some issues might be raised by prepaid mobile schemes, but even for them the establishment of anti-money laundering measures is not likely to be a problem.

It was unclear whether this situation would remain unchanged, and thus if a non-bank would be able to issue prepaid instruments. In 2000, the balances on stored-value cards (including mag-stripe prepaid debit cards) were not considered deposits.

7.3.1.5 Regulation E

Federal Reserve Board's Regulation E implements the Electronic Funds Transfer Act and includes provisions to protect consumers when they use electronic payments. It applies not just to banks, but also to non-bank institutions offering electronic payment services.

Under Regulation E, consumers are given certain rights of disclosures and protections and payment providers (and other involved parties) are subject to certain responsibilities and obligations. Vartanian (2000), however, states that in many areas, the application of Regulation E remains unresolved or open to dispute.

7.3.1.6 FDIC Insurance

E-money balances might be subject to Federal Deposit Insurance Corporation (FDIC) regulation depending on the nature of the newly created e-money products. The extent to which the balances are insured is determined by the products' compliance with the FDIC's definition of "deposits".

Some issuers might want to purposely construct their products to stay out of the federal banking regulation, while others might choose to do the opposite for marketing purposes.

Vartanian (2000) describes the key factor determining whether an e-money product would be FDIC insured as the "actual location" of the funds corresponding to the issued e-money liabilities. If they reside in a deposit account, the e-money is likely to be insured, regardless of the transmission of the representative electronic equivalents.

Although this approach might seem straightforward, it can cause confusion in the situations where the legal requirements do not fit the specific characteristics of the innovative products.

7.3.2 Uniform Money Services Act

The origins of the Uniform Money Services Act (UMSA) go back to 1994, when the U.S. Congress enacted the Money Laundering Suppression Act (MLSA). The MLSA urged States to enact uniform laws to license and regulate money services businesses, particularly with respect to the emerging payment providers.

In July 2000, the National Conference of Commissioners on Uniform State Laws (NCCUSL) agreed on a proposal for the Uniform Money Services Act (UMSA).¹⁶⁵ The main motivation behind the efforts to create a uniform legal framework was the difficulty for non-banks to comply with the various State laws when conducting business on the nation-wide level. UMSA aims to provide a framework for regulation of a wide range of financial (payment) services, not just e-money activities.¹⁶⁶

The UMSA uses the previously established and recognized institution of “money services business” (MSB).¹⁶⁷ MSBs are non-bank entities that do not accept deposits or make commercial loans, but rather provide alternative payment mechanisms. MSBs have been traditionally State-regulated. According to the UMSA, MSBs engage in four types of activities: (1) money transmission; (2) the sale of payment instruments; (3) check cashing; and (4) foreign currency exchange.¹⁶⁸

Under the UMSA, MSBs need to comply with a license requirement¹⁶⁹ and prudential supervisory rules.¹⁷⁰ It is noteworthy that the UMSA does not set out a “state of origin principle”, which would allow an MSB licensed in one State to conduct business in other States as well. As a result, an MSB, which wants to market its services across different

¹⁶⁵ NCCUSL (2000)

¹⁶⁶ In 2000, the Drafting Committee of NCCUSL decided that Internet-based payment schemes should be included into the UMSA if they involved the sale and issuance of monetary value or (non-bank) transmission of the monetary value. The final UMSA proposal, however, did not include new separate licensing frameworks for Internet payment systems. Rather, the UMSA adapted the existing rules for new technologies.

¹⁶⁷ Other previously used terms describing non-banks are “non-bank financial institutions” (NBFIs) or “non-depository providers of financial services” (NDPs).

¹⁶⁸ MSBs have been traditionally associated with “unbanked” ethnic and immigrant communities in the US.

¹⁶⁹ Section 201 (License required)

¹⁷⁰ Section 203 (Security), Section 206 (Net worth), Article 6 (Examinations, reports, records), Article 7 (Permissible investments)

States, needs to apply for a separate license in each of them. (The UMSA attempt to unify the rules, but since the legal adoption is exclusively upon the State regulators, the final implementation of the UMSA framework is likely to vary State by State.)

The following three sections summarize the main implications of the final proposal of the UMSA on the key concepts and the legal framework for innovative electronic payment schemes.

7.3.2.1 Monetary value

Section 102 of the UMSA defines “monetary value” as “a medium of exchange, whether or not redeemable in money”. The UMSA expands the former definition of the monetary value to reflect a form of value that may not be directly redeemable in “money”,¹⁷¹ but serves as a medium of exchange and positions the customer at risk of the provider’s insolvency while the value is outstanding.

This monetary value needs to be accepted as a medium of exchange by a community larger than just two parties. Generally, the monetary value is defined to exclude mere bilateral units of account; or units of account used for exchange (in closed-end systems) with a single issuer or merchant, or within a small geographic area.¹⁷² The determination of whether a certain form of value used as a medium of exchange has become a monetary value remains upon the State regulators.¹⁷³

7.3.2.2 Stored value

The UMSA consequently defines “stored value” as “monetary value that is evidenced by an electronic record”. It is noteworthy that the UMSA does not require that the stored

¹⁷¹ According to the UMSA Section 102(12), “‘money’ means a medium of exchange that is authorized or adopted by the United States or a foreign government. The term includes a monetary unit of account established by an intergovernmental organization or by agreement between two or more governments.”

¹⁷² For example, a balance on a single-purpose prepaid card which can only be used with the issuer would not constitute monetary value. If the card were accepted (by several merchant) within a small geographic area (e.g., a university campus), the balance on it would probably not constitute monetary value. If the card were accepted by a majority of local merchants or by merchants in other (remote) locations, the balance would probably represent a monetary value.

¹⁷³ When deciding on whether a particular scheme should be a subject to regulation as a system based on the usage of monetary value, the regulators need to evaluate the level of circulation, redeemability, multipurpose-usage potential etc.

value be embedded in an electronic device. Within the UMSA framework, the (storage/payment) instrument is not conceptually relevant to the stored-value status.¹⁷⁴

7.3.2.3 Money transmission

The UMSA's definition of "money transmission"¹⁷⁵ covers the transmission of funds as well as the sale or issuance of payment instruments and the sale or issuance of stored value. Consistent with the traditional State regulation, the UMSA treats stored value similarly to payment instruments.

Payment providers that hold consumers' funds or monetary value for their own account fit the definition of money transmitters. On the other hand, clearing agents (who only transfer funds between different parties), delivery services and pure data transmitters (e.g., Internet service providers) stay outside the scope of regulation.

7.3.3 Implementation of the UMSA

The first State to adopt the UMSA was Vermont in April 2001. Other States were expected to follow in 2002. The author has found by investigating into particular sources of State law that, for example, Iowa adopted the UMSA in October 2003 and Washington in April 2003. However, a self-contained survey on the state of adoption was not available in March 2005.¹⁷⁶

By the implementation of the UMSA, the States have the opportunity to benefit from unified legal framework that creates a potential for greater efficiency and flexibility of certain payment services. Bringing down the competition barriers may even result in payments cost reduction.

¹⁷⁴ In fact, the monetary value might not be stored on any identifiable physical object. It can be stored, for example, by purely cryptographic means.

¹⁷⁵ According to the UMSA Section 102(14), "'money transmission' means selling or issuing payment instruments, stored value, or receiving money or monetary value for transmission. The term does not include the provision solely of delivery, online or telecommunications services, or network access."

¹⁷⁶ Based on searching <http://www.google.com>, and reviewing <http://www.nccusl.org/nccusl> on March 20, 2005.

7.4 ELMI Directive and UMSA comparison

It could have been noticed from the previous sections of this text that the range of activities that the UMSA aims to regulate goes beyond the scope of the ELMI Directive. The UMSA covers both traditional and new “money services”,¹⁷⁷ whereas the ELMI Directive focuses solely on e-money. Besides this difference in an overall approach to regulation, other notable divergences and similarities can be identified. Some of them are discussed below.

7.4.1 Regulatory aspects of payment systems innovation

From the very beginning of the e-payments development the EU has tried to create a general regulatory framework to protect customers, establish an appropriate level playing field, and prevent potential future cost of adaptation (of the existing schemes to new rules). The original ECB position is discussed in the Section 7.2.1 and will not be repeated here. The following paragraphs describe the position of the U.S. federal regulators.

Greenspan (1996) argued that the international financial system was becoming increasingly complex. In such an environment, the national regulators have limited power and the financial system increasingly relies on private market self-regulation.

Greenspan (1996) suggested that detailed rules and standards had become ineffective or even counterproductive. He stressed the need to carefully consider any application of far-reaching regulatory restrictions as they might impede innovation. This particularly applies to retail payments.

Greenspan (1996) used the example of the ACH developments¹⁷⁸ to support his hypothesis that governmental interventions may slow down the private-sector payment initiatives. According to him, government’s active involvement in determining the technology to be used by the market participants might hinder progress and, at the same

¹⁷⁷ According to the UMSA Section 102(13), “‘money services’ means money transmission, check cashing, or currency exchange”.

¹⁷⁸ Despite many efforts to adapt the ACH to be able to accommodate the needs of payment market participants, ACH have appeared to be stifling to a more flexible system ensuring a broad range of retail transactions.

time, it can hardly ensure it. The private sector needs flexibility to be able to develop new ways of payment.

Stern (2003) reviews two key principles of the Fed's involvement in retail payment systems. The first principle is that the Fed should not provide new payment services unless market failures occur. The second principle is that the Fed should aim to improve payment systems' performance through identifying weaknesses in the payment infrastructure, providing information to the market participants and helping overcome coordination problems. Furthermore, Stern (2003) specifically stresses the current and future role of private sector innovation in the evolution of the U.S. retail payments.

7.4.2 Implementation of the unified law

Comparing the EU and the U.S. regulation of e-money (and/or stored value), one will notice a similarity in the way the rules are created and implemented. Although the USA is a single country, its concept of federalism puts strong emphasis on the States' sovereignty and requires a particular regulatory regime to be implemented by individual States.

Moreover, the State legislators in the USA enjoy a greater deal of freedom. Whereas the EU Directives form supranational law, which must be implemented by the Member States, the U.S. Uniform Acts are not more than proposals of the NCCUSL that are recommended for adoption, but not binding. American States are free to amend and modify the Uniform Acts they plan to enact, or they can dismiss them altogether.

7.4.3 Perception of "e-money"

The U.S. regulatory approach differs from the EU one in that it does not recognize the theoretical concept of e-money as a new (revolutionary) means of payment. Rather, it views e-money as just another payment service, which might have more in common with travelers checks and wire transfers than with a replacement for cash.

The Article 1(3)(b)(iii) of the ELMI Directive ("[e-money should be] accepted as means of payment by undertakings other than the issuer") corresponds with the UMSA's interpretation of the "medium of exchange".¹⁷⁹ The "waiver" provision (Article 8) of the

¹⁷⁹ According to UMSA Section 102, Comment 10, the "term 'medium of exchange' connotes that the value that is being exchanged be accepted by a community, larger than the two parties to the exchange".

ELMI Directive is reflected in the UMSA¹⁸⁰ by the reliance on the regulators in determining whether a particular Internet payment method has become widely accepted.

Recalling the controversial points of the ELMI Directive's e-money definition and rules, it is noteworthy that the UMSA's concept of the "monetary value" does not require redeemability, nor does it define that the monetary value should be "issued on receipt of funds of an amount not less in value than the monetary value issued" (ELMI Directive, Article 3).

The UMSA was written to cover coupons, loyalty schemes, gift certificates, dedicated accounts or other schemes that are only redeemable in goods or services and that might "generate" value. The authors took into consideration the existence and growth of some of these schemes when preparing the proposal.

7.4.4 Non-bank institutions provisions

Both the ELMI Directive and the UMSA distinguish traditional banking institutions and non-banks. However, unlike the European ELMIs, which are considered a special type of credit institutions, the U.S. MSBs stay entirely out of scope of the banking regulation.

ELMIs and MSBs are equally subject to licensing and prudential requirements. The initial capital requirement of €1 million for ELMIs is significantly higher than the \$25,000 for MSBs. However, the requirement might be waived (ELMI Directive, Article 8) for small e-money issuers in the EU and, in turn, U.S. regulators can impose higher capital requirements.

Both the ELMI Directive (Article 5) and the UMSA (Section 701) require the regulated institutions to maintain investments not lower than their financial liabilities related to the "outstanding e-money"/"outstanding payment instruments and stored value". Both sources also specify that the investments must be held in permissible low-risk assets.

Unlike the ELMI Directive, the UMSA does not provide for any equivalent of the "EU passport". Whereas an ELMI licensed in one of the Member States is allowed to conduct

¹⁸⁰ "With Internet payments, the regulators will also have to make the same type of determination as to when a certain type of monetary value has become widely accepted as to constitute a medium of exchange." (UMSA, Section 102, Comment 10)

business across the EU, a MSB must apply for a license in each State where it aims to provide its services. Considering that UMSA per se does not guarantee a unified implementation of the money services law, it might be more burdensome for an MSB to roll out an interstate business than for an ELMI to start an international business within the EU.

7.5 Note about P2Ps regulation

Since the scope of the UMSA includes “monetary transmission” (and does not link the stored value and the instrument), determining whether the P2Ps are covered by the UMSA regulation has not been a problem. In contrast, ELMI Directive’s coverage of P2Ps has been disputable (mostly due to the character of the “electronic device”). This section examines several aspects of the situation of P2Ps from the regulatory perspective of the USA and the EU.

7.5.1 P2Ps regulation in the USA

The problem of P2Ps regulation in the USA can be demonstrated by the example of PayPal, the market leader. The discussions around PayPal have focused on answering two major questions. First, should PayPal be considered a business providing money transmission? Second, is it acting as a bank and thus needs a banking license?

The User Agreement for PayPal Service (PayPal, 2005), Section 2.1 states that “PayPal acts as a facilitator to help... [the user] accept payments from and make payments to third parties...” and that PayPal acts as the user’s agent. As far as the money transmission is concerned, PayPal recognizes that regulation in most of the States covered its services.

According to eBay (2005b), as of February 2005, PayPal obtained money transmitter licenses¹⁸¹ in 32 States, and received interpretations from 9 States that licensing was not required.¹⁸² PayPal still has pending applications in some States. If any of them are

¹⁸¹ Money transmitters are subject to bonding requirements, restrictions on investment, reporting requirements and inspection by State regulatory agencies.

¹⁸² Paypal’s website lists only these States where it has received a license: Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Idaho, Illinois, Iowa, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Nebraska, North Carolina, Ohio, Oregon, Pennsylvania, Puerto Rico, Rhode Island, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, Wyoming (<https://www.paypal.com/cgi-bin/webscr?cmd=p/ir/licenses-outside>, accessed March 20, 2005).

denied, PayPal could be found violating money services law or regulation and in the worst-case be forced to cease offering its services to residents of some States.¹⁸³

Concerning the banking license requirement, the regulators of the States of New York and Louisiana questioned PayPal's status in 2000. As a result, PayPal changed its operations in two major ways:

- 1) it established the PayPal Money Market Fund where the outstanding account balances could be transferred;¹⁸⁴ and
- 2) it placed the remaining balances (those that are not in the Money Market Fund) into non-interest bearing FDIC-insured bank accounts¹⁸⁵ over which PayPal had no authority for loans or withdrawals for corporate purposes.¹⁸⁶

The User Agreement declares that “(i) PayPal is not a bank and the Service is a payment processing service rather than a banking service, and (ii) PayPal is not acting as a trustee, fiduciary or escrow with respect to... [the user's] funds, but is acting only as an agent and custodian”.

¹⁸³ The legal issues mentioned here focus on the transactional part of payment provision. PayPal also faces (possibly more serious) problems related to the scope of its payment-provision activities. Different institutions concluded that some of its services (e.g., provision of payments for gambling and adult content sites) and procedures (e.g., money laundering prevention) conflicted with the U.S. Patriot Act or other laws. So far, the disputes were resolved by fines and service adjustments.

¹⁸⁴ If a user enrolls in the PayPal Money Market Fund, “PayPal’s subsidiary PayPal Asset Management Inc. will act as an agent to transfer any U.S. dollar balances in ... [the user's] PayPal account on a daily basis to purchase shares in the Money Market Fund” (PayPal, 2005). Consequently, the user's payments through PayPal are funded by redemption of his shares. The implication is that balances in the Money Market Fund are held “directly” by the user without any claim by PayPal.

¹⁸⁵ These accounts are also called “pooled accounts”. They are eligible for FDIC pass-through insurance along with other deposits the user holds at a particular bank, up to a total of \$100,000 per user per bank. “As of March 12, 2002, ... [the users] available balance funds are held at the following institutions: Wells Fargo Bank, N.A., Comerica Bank—California, USA, and Bank of America, N.A.” (<http://www.paypal.com/cgi-bin/webscr?cmd=p/gen/fdic-outside#>, accessed March 20, 2005). The insurance covers potential consumer losses from the banks' failure, not from possible failures of the PayPal service.

¹⁸⁶ PayPal's User Agreement further specifies “PayPal will at all times hold... [the users'] funds separate from its corporate funds... and will not voluntarily make funds available to its creditors in the event of bankruptcy or for any other purpose” (PayPal, 2005).

In 2001, the FDIC declined to determine whether PayPal was a bank since it was not a bank (or a savings association) for the purpose of the Federal Deposit Insurance Act. In later statements the FDIC suggested PayPal was not a bank.

Besides the questions around banking and money transmission, the involved parties have also been concerned about the impact of Electronic Fund Transfer Act and Regulation E on the PayPal's business. So far, PayPal assumed that its service is subject to those.¹⁸⁷ Furthermore, PayPal is subject to the financial privacy provisions of the Gramm-Leach-Bliley Act and related regulation.

7.5.2 P2Ps regulation in the EU

There have been discussions trying to determine whether P2Ps meet the criteria of e-money in the definition of the European Parliament (EP, 2000). According to some recent initiatives, it seems that they do. In its implementation of the ELMI Directive, FSA considers the P2P providers ELMIs. Its reasoning is based on perception of "electronic device" as any device ranging from a smart card "in the pocket" of a consumer to a remote database server of the e-money issuer.

PayPal (Europe) Ltd., a wholly-subsiary of PayPal Inc., received a license to operate as an ELMI in the UK in February 2004 (FSA Register Number 226056). Under the "EU passport" policy, this warrants PayPal to provide its services in other EU countries based on notification. According to eBay (2004b), PayPal has completed the migration of all EU customers to the PayPal (Europe) Ltd. subsidiary. PayPal may be subject to vast enforcement action if it violates the ELMI regulation.

The User Agreement for PayPal Service in the EU (PayPal, 2005b) defines that by sending payments or adding funds the user "authorize[s]... [PayPal] to obtain funds on... [his] behalf from... [his] chosen funding source, to issue e-money and to transfer the e-money to the recipient... or to... [his] account balance".

The currencies in which the e-money is denominated are Sterling for UK customers, Swedish Krone for Swedish customers, Danish Krone for Danish customers and Euro for customers in other EU Member States. Automated conversion applies when transferring

¹⁸⁷ As a result, PayPal must, for example, absorb losses above \$50 from unauthorized transactions.

funds between accounts of different currencies. One PayPal account can also hold balances in multiple currencies.¹⁸⁸ The outstanding e-money balances are not subject to any time limitation as to their validity. In order to hold a balance of over £1,000 or equivalent in other currencies, the user must agree to additional rules. None of the balances is covered by any public or private insurance.

UK-based Moneybookers was the first e-money issuer that received an ELMI authorization under the FSA rules (FSA Register Number 214225). As to the issuance and redemption of e-money it functions in a similar way to PayPal (Europe) Ltd.

Besides non-bank initiatives, there are also P2Ps provided by banks. NatWest's FastPay, Rabobank's MiniTix and ING's Way2Pay prove that banks are not necessarily excluded from the ability to implement new P2P solutions. They could even offer a broader range of services, some of which might not be provided by non-banks due to regulatory restrictions.

7.6 Note about m-payment regulation

So far, the providers of mobile customer accounts in many countries remain unrecognized by the regulators. The awareness of current and future product development in the (mobile) telecommunications sector is low. This is despite the fact that telecoms are increasingly introducing new services enabling customers to use their (prepaid) airtime accounts for payments to third parties.

The absence of clear legal definitions and the uncertainty about the applicable rules certainly does not benefit the dynamics of market developments. The same applies to the regulation that was not created with respect to the mobile schemes. In such a case, some general requirements (concerning, for example, consumer protection and privacy) might encounter the practical limitations of mobile devices.

Whether and under what conditions the activities of m-payment providers should be regulated has not been a significant matter of interest of many regulators. On the other hand, some regulators have addressed the issue. For example, FSA (2003) stated that

¹⁸⁸ Canadian Dollar, Euro, Pound Sterling, U.S. Dollar and Yen as of March 21, 2005.

individual guidance to certain telecoms was already issued and the FSA was in the process of consulting a relevant general guidance.

The position of FSA (2003) is that prepaid airtime, which can only be used to buy services provided by the (issuing) telecom should not be considered e-money. The prepaid airtime used to call a PRS number should not constitute e-money if the supply of telecommunication services (data transport) by the telecom and the supply of services by the PRS provider can be seen as a single service; and the supply of the airtime and the supply of the PRS take place in the same action.¹⁸⁹ In other cases, prepaid airtime used to purchase PRS services is likely to constitute e-money.¹⁹⁰

In May 2004, the European Commission started a consultation with mobile operators and other stakeholders concerning the application of the ELMI Directive to balances on the prepaid mobile phone accounts used for purchases of goods and services from third parties. The major concern was the perception of the mobile operators as “hybrid” issuers of e-money, in other words businesses that are likely to be issuing e-money, but do not do it as their main activity and may not have a license.

For mobile operators, the activities that may constitute the issuance of e-money are currently marginal, but may become significant with third generation mobile services. At the same time, the search for appropriate legal frameworks seemed important given the possibility of similar cases of “hybrid” e-money issuers emerging in the future, e.g., transport authorities or retail outlets.

Critics¹⁹¹ say that the main issue was the operators’ unwillingness to conform to the requirements of the existing law. In their view, mobile operators lobbied for adjustment of the rules to suit their business interest. That of course would be far from the Commission’s proclaimed efforts to create a level playing field for all payment providers.

¹⁸⁹ The common understanding was that if the goods or services were delivered to the mobile device and consumed while the device was still being used, the payment did not represent a use of e-money (e.g., the use of a mobile phone as a modem to connect to the Internet). In addition, if the goods or service were delivered or consumed by way of mobile device used for their order or another mobile device, it would not constitute a use of e-money.

¹⁹⁰ Similar specific guidance related to schemes that directly charge prepaid airtime accounts for a provision of goods or services was not available in March 2005.

¹⁹¹ Association of E-money Institutions in the Netherlands (2004)

However, the consultation indeed focused more on arrangements that would enable the operators to bypass the current legislation (e.g. waivers), than on compliance.

The Commission drew some conclusions, but did not suggest a guiding interpretation of the Directive. The Commission suggested that national regulators evaluate whether there is a direct exchange of value between the mobile customer and third-party vendor, and whether the mobile operator acts as a payment facilitator. According to the consultation responses, that happens only in a limited number of cases, which would imply that most transactions do not involve e-money.

8 Conclusion

The motivation for this thesis was to find out about the current situation of electronic money. The e-money schemes on the Internet caused a great stir in the late 1990s. At that time many speculations and arguments about their potential influence on payment processes and the economy as a whole emerged. After the so-called dot-com bubble burst and the excitement faded away, the outcomes and the continuing trends were unclear. This was accompanied by difficulties in the introduction of e-money based payment instruments used at physical POS. The primary task was thus to find out if e-money still exists in practice and if so, what forms it takes and how these differ from their predecessors.

As the research progressed, new questions emerged. Many of them were related to the future prospects of the found schemes and to the barriers that may prevent their proliferation. Also, the potential for broader acceptance by the public, the value propositions of individual types of instruments, the legislative and regulatory environments and numerous other subjects had to be considered.

Based on these considerations, the specific goals for the thesis were established. These are stated in the Introduction and include the creation of a unified framework for analysis, the construction of selection criteria, the identification, characterization and classification of the selected instruments, the evaluation of future prospects, the identification of barriers to adoption and the research of legislation and regulation. The overall goal was to analyze the current and potential trends in the field of prepaid payments and their implications for payment systems.

The research faced many challenges, starting with defining e-money and constructing consistent selection criteria for the instruments to be covered, and including the challenges of finding, characterizing and (when possible) testing particular schemes. At the same time, all the sources of information had to be checked for validity and topicality against other sources due to rapid changes in the field.

Summarizing the different aspects of payment instruments described in this thesis, one may derive several conclusions about them.

Electronic purses have been deployed with mixed results, and many years after their first launch remain marginal. The open question is whether this is due to the factors of discontinuous innovation, network effects and other transitory elements, or because they do not represent a viable payment solution.

The fact that smart chip technology is expanding in the cards market and that the new payment cards are assumed multifunctional support the first argument above. Of course, the question whether cards per se will survive as payment tools in the future remains open. Recent developments in contactless chip technology suggest a possible integration of card functionality into other devices (e.g., a mobile phone or a PDA). At the same time, many authors do not expect a total replacement of payment cards in the foreseeable future.

Prepaid debit cards bring a greater flexibility to certain types of payment products, rather than revolutionary changes.¹⁹² For example, they replace gift certificates or travelers checks with a more efficient and convenient instrument. Prepaid debit cards (as they were described in this paper) are apparently bound to the “old” technology of POS networks. Due to the fact, that they “look the same as credit cards”, the discussions around them do not focus on technical features, but the prepaid principle. Prepaid value has recently experienced an increased popularity in various areas and its importance is expected to grow.

The debate about prepaid dedicated accounts (as they were described) can be divided in two parts.

First, there are schemes intermediating smaller-value Internet payments that are based on bridging the gap between the deficiencies of traditional instruments (in supporting effective and secure distant payments) and the new requirements. Are these schemes transitory by definition? Indeed, some of them do not represent prospective self-contained payment solutions, but rather (evolution-wise) temporary supplements, whose revenue model comes in question in a medium-term perspective. Despite that, the

¹⁹² Although they are considered revolutionary by some authors as they dramatically expand the functionality of traditional prepaid schemes, such as gift vouchers.

current situation on some payment markets may justify their usage in the (many) coming years.

The second part of the debate focuses on the increasing role of paid (premium) digital content requiring efficient micro-payment services. The medium term prospects of the prepaid dedicated accounts in this domain depend on the flexibility of other instruments and the compelling value proposition of prepaid dedicated accounts.¹⁹³

P2Ps have recently enjoyed significant popularity. Notable success stories have been documented and the growth figures are promising. P2Ps' holes are especially the lack of interoperability and the security issues. The technical aspects of security are crucial as the volume of funds transferred through P2Ps increases.¹⁹⁴

Theoretical reasoning and current trends suggest that a successful P2P is likely to provide a wide payment solution mix. For example, such a service can issue debit cards to the accounts, transfer of balances into (third-party) interest-bearing accounts or provide special customized features for target user groups (e.g., merchants). The argument that such P2Ps then actually become banks is usually not true. If it was, then the trend could be perceived positively if it should mean that those "banks" will set up new and more efficient (banking) industry practices in the area of payments.

M-payments might have a good chance to solve the network effect-related problems of e-purses. The high penetration of mobile devices is a reality in many regions. Whether mobile phones could in the near future replace plastic cards is not clear. Their potential in the unattended POS transactions and proximity payments is more straightforward.

In the mobile content area, the need for effective payments seems to make further developments and standardization inevitable. Currently, the transactional model, which charges the (prepaid) airtime accounts, is expected to dominate in the near future.

M-payment schemes are currently in the early stages of deployment. Further development

¹⁹³ Particularly important appears to be the ability to build universal, but greatly flexible and customizable systems that can be easily implemented into the systems and processes of various merchants.

¹⁹⁴ Obviously, the security is important for any payment scheme. However, the issues are different for micro-payment systems, where the balances tend to be lower and some illegal practices are hardly imaginable when applying essential security measures, and for the P2P systems which can potentially deal with amounts comparable to those transacted through banks' current accounts.

is conditioned by the successful standardization, cooperation and security building efforts.

The recent past has shown the significant potential of new payment systems that are able to exploit the established infrastructure in order to provide new functionality to consumers. On the other hand, technology-driven and overly enthusiastic projections and visions threaten business success in the field of payment provision.

As with other areas of entrepreneurship, the fundamental question is linked to the value proposition that the innovation brings to the customer. Fulfillment of specific customer's needs is a prerequisite for a viable payment scheme, and thus any further reasonable analytical and strategic considerations.

This is not to say that the value proposition is simple to recognize and describe. In fact, it is quite complex. While evaluating viable solutions, attention must be paid to a proper (i.e. as good as possible within given limits) understanding of the potential customer needs, market structure and institutional framework. The institutional framework consists of the legal rules discussed here, but also payment habits, cultural values, contracts, social links, forms of organizations etc. A thorough examination of these aspects was out of scope of this project and may form a subject for future research.

Arguably, the payment systems regulation has an influence on market developments. The "wait-and-see" approach of the U.S. regulators might be considered more liberal than the far-reaching "early-regulation" of the EU, and thus facilitating innovation. However, the examination of practical implementations has revealed that the whole problem of estimating the impacts of regulation is more complex.

Regulators have been trying to ensure consumer protection while at the same time not hinder innovation and competition. The results are mixed. Legal harmonization and unification has progressed in both the EU and the USA. Many unresolved issues remain, however, and new ones will appear as the existing payment systems alter and new initiatives emerge.

Non-bank institutions' direct involvement in payments raises new questions. The new payment schemes are not used widely enough to indicate whether they could impose significant systemic risk to the financial system.

UK's FSA guidance (within the EU framework) shows a reasonable approach to (prepaid) payment systems regulation both ensuring consumer protection and allowing for innovation and small ventures. Whether the European Commission will choose a similarly consistent approach is not clear. In fact, some stakeholders are skeptical.

The thesis has discussed some of the challenges in the emerging payments area; for instance the dependence of innovative payment systems on the sufficiently large networks and the gain of critical mass. Other challenges are related to security, common standards, law enforcement, risk management, authentication, contractual regulations of liabilities and legal regulation.

Straight-through processing (STP),¹⁹⁵ integration (of payment technologies into existing transaction systems) and interoperability are major standardization goals. STP has been long technologically feasible and applied in closed groups of payment participants. The new challenge consists in adaptation to the altered environments, such as open networks. The increased number of stakeholders in the payment cycle makes the standardization efforts rather complex.

Despite the challenges, there are several reasons why innovative electronic payment instruments should eventually prevail. First, they have a potential to save costs in the long run. Second, instant transfers of value will be highly demanded with the continuing growth of e-commerce. And third, the consumers are likely to prefer the innovative instruments when the use of the traditional instruments becomes impractical due to changed circumstances.

Technological innovation can increase the efficiency of payments by reducing transaction costs. E-money payments are cheaper and faster than traditional non-cash payments. They can be executed with close to zero marginal costs. Furthermore, the use of simple

¹⁹⁵ STP can be briefly described as “the capture of trade details directly from front office systems to back office... [STP] completes automated processing of clearing and settlement instructions without the need for re-keying or reformatting data.” (Hawkins, 2001, p.112)

familiar recipient identifiers, such as e-mail addresses, makes them more convenient for users.

The question that remains is whether prepaid electronic payment instruments will be widely used in the future. So far, it seems that they will ultimately find their place in the market as their features are more suitable for certain uses than other existing instruments. The lessons from past developments in the area of payment systems innovation is, however, that it takes time for all consumer, businesses and governments to get used to them.

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10 Appendix

Table 10.1

Credit card use for online purchases by region in 1999

In percentages

	USA	Iberia & Latin America	Western Europe	Non-U.S. English speaking	Asian Tigers	Rest of World
Credit card/online purchases	78	47	42	75	48	37

Source: Lafferty Publications; available from ePayNews (<http://www.epaynews.com/statistics/purchases.html>, accessed March 20, 2005)

Table 10.2

How top 25 online merchants are paid/would prefer to be paid

In percentages

Method	Actual	Preferred
Credit card online	77	64
Credit card by phone, fax, mail	7	0
Checks by mail	8	0
PIN-less debit	3	5
PIN-based debit	1	18
ACH or e-check	1	5
Other e-cash	0	9
Other	4	0

Note: The sums do not add up to 100 probably due to rounding.

Source: Gartner Group, November 2002, available from ePayNews (<http://www.epaynews.com/statistics/purchases.html>, accessed March 21, 2005)

Table 10.3**Factors discouraging U.S. consumers from using a credit card online**

In percentages

Factor	Percentage
Concerned about security	70
Hassle to enter information	9
Do not have a credit card	7
Do not like interest charges	6
Purchase value too small	4
Exceeded personal limit	4

Source: PaymentOne, April 2003, available from ePayNews
 (<http://www.epaynews.com/statistics/fraud.html>, accessed March 18, 2005)

Table 10.4**U.S. consumers' concerns over online & offline card fraud**

In percentages

Credit card security concern	Percentage
Major/moderate	76
Minor/no concern	24
Online credit card security concern	Percentage
Major/moderate	69
Minor/no concern	30

Note: The sums do not add up to 100 probably due to rounding.

Source: Ipsos-Insights, January 2004, available from ePayNews
 (<http://www.epaynews.com/statistics/fraud.html>, accessed March 18, 2005)

Table 10.5**Relative importance of cashless payment instruments**

As a percentage of total volume of cashless transactions

	Cheques					Payments by credit/debit cards				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
Belgium	7.0	5.8	5.0	3.8	1.7	27.3	28.9	32.8	33.3	34.6
Denmark	9.6	7.8	6.7	5.5	4.5	48.4	50.1	51.1	53.7	54.5
Germany 1), 2)	4.2	3.8	3.3	2.6	1.2	9.2	10.7	13.4	14.7	16.6
Greece 3), 4)	nav	nav	22.1	22.5	19.2	nav	nav	64.5	62.5	56.1
Spain 5)	12.9	10.7	8.9	7.3	6.0	23.5	24.3	22.9	26.3	36.4
France	44.1	40.1	37.9	35.4	34.2	23.6	26.1	27.8	30.0	30.6
Ireland	56.6	49.2	41.3	30.1	26.3	7.8	22.6	28.0	39.7	47.4
Italy	28.2	25.2	21.7	19.3	17.2	15.1	18.0	21.2	24.7	29.1
Luxembourg	2.7	2.1	1.6	1.2	0.7	62.7	61.7	61.5	60.9	61.2
Netherlands 4)	1.8	1	0.5	0.2	neg	25.1	27.8	29.3	31.9	32.8
Austria 6)	2.8	2.1	1.4	1.0	0.6	8.1	10.5	12.2	14.6	17.3
Portugal 7)	39.8	34.1	29.0	27.1	24.1	44.0	47.2	50.6	56.4	58.2
Finland 4)	0.3	0.1	0.1	0.1	0.1	37.4	38.4	40.5	42.5	45.5
Sweden	0.4	0.3	0.2	0.2	0.1	20.9	22.3	26.7	31.6	50.6
United Kingdom	31.7	28.8	26.1	23.5	21.0	31.5	34.3	36.6	39.0	41.2
EU 8)	21.3	19.0	17.2	15.5	14.5	21.0	23.3	26.6	29.0	32.2
Euro area 8), 9)	20.1	17.8	16.0	14.6	13.8	18.4	20.7	22.7	26.6	29.6

Table 10.5 (continued)

	Credit transfers					Direct debit				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
Belgium	54.0	51.9	46.7	47.8	46.9	9.4	10.2	11.8	11.2	9.8
Denmark	25.9	25.7	25.7	24.1	24.5	15.2	15.5	15.6	15.8	15.7
Germany 1), 2)	47.7	47.0	45.0	44.7	45.0	38.8	38.4	38.1	37.8	36.9
Greece 3), 4)	nav	nav	9.1	6.8	10.8	nav	nav	4.3	8.2	12.5
Spain 5)	14.7	14.5	15.2	15.6	14.7	48.9	50.5	52.9	50.7	42.8
France	17.8	18.4	17.7	17.8	18.7	14.4	15.5	16.6	16.8	16.3
Ireland	16.9	12.9	13.7	13.0	13.3	18.7	15.4	17.1	17.1	13.0
Italy	42.3	38.0	36.6	34.8	31.8	14.4	18.8	20.5	21.1	22.0
Luxembourg	29.7	29.9	28.1	27.2	24.9	5.0	5.7	6.5	8.1	7.9
Netherlands 4)	44.0	41.2	40.4	39.1	37.0	28.4	29.3	28.9	27.9	27.6
Austria 6)	61.3	57.8	56.0	55.5	46.6	27.7	29.3	30.1	28.4	33.7
Portugal 7)	6.3	6.3	7.7	4.4	6.3	9.2	11.9	12.1	11.8	11.3
Finland 4)	58.5	56.8	54.6	52.3	49.3	3.9	4.6	4.7	5.0	5.0
Sweden	71.2	69.6	65.4	60.4	38.8	7.3	7.4	7.5	7.7	10.4
United Kingdom	18.3	18.1	17.8	17.7	17.7	18.5	18.8	19.4	19.7	20.1
EU 8)	32.9	31.7	30.0	29.3	28.3	24.6	25.8	25.9	25.9	25.1
Euro area 8), 9)	34.8	33.4	32.3	30.8	30.1	26.5	27.9	29	27.7	26.7

Table 10.5 (continued)

	Card-based e-money				
	1998	1999	2000	2001	2002
Belgium	2.3	3.3	3.6	3.8	7.0
Denmark	1.0	1.0	1.0	0.9	0.8
Germany 1), 2)	0.1	0.2	0.2	0.2	0.3
Greece 3), 4)	nap	nap	nap	nap	nap
Spain 5)	0.1	0.1	0.1	0.0	0.04
France	nap	nap	nav	0.02	0.1
Ireland	neg	neg	nap	nap	nap
Italy	neg	neg	neg	neg	neg
Luxembourg	nap	0.7	2.3	2.7	5.3
Netherlands 4)	0.7	0.8	0.9	1.0	2.6
Austria 6)	0.1	0.3	0.3	0.5	1.7
Portugal 7)	0.7	0.6	0.5	0.3	0.1
Finland 4)	0.02	0.06	0.06	0.1	0.1
Sweden	0.2	0.4	0.2	0.1	0.1
United Kingdom	nav	nav	nav	nav	nav
EU 8)	0.3	0.4	0.5	0.4	0.7
Euro area 8), 9)	0.3	0.4	0.5	0.5	0.7

Notes:

- 1) Payments by credit cards: from 2000 onwards, the figure includes retailer card transactions.
- 2) Direct debits: debit card transactions are not included under this item but are shown under "Payments by debit cards".
- 3) All checks for which the acquiring bank is different from the issuing bank.
- 4) The figures for payments by credit/debit cards include payments by cards with a delayed debit function.
- 5) This table does not include data relating to bills of exchange, travelers checks and other documents.
- 6) Credit cards does not include delayed debit cards (charge cards); credit transfers and direct debits do not include items initiated by banks; these data are not available.
- 7) This table does not include data related to bills of exchange.
- 8) Total excluding countries for which data are not available.
- 9) Following its entry to the euro area, the figures for 2001 onwards include Greece.

Source: ECB (2004)

Table 10.6**Relative importance of cashless payment instruments**

As a percentage of total value of cashless transactions

	Checks					Payments by credit/debit cards				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
Belgium	3.2	0.6	0.5	0.6	0.7	0.2	0.1	0.2	0.2	0.2
Denmark	31.0	24.0	20.8	18.9	16.5	3.3	3.6	3.7	4.0	4.3
Germany 1), 2)	10.4	3.8	3.2	2.7	2.3	0.3	0.3	0.4	0.4	0.4
Greece 3), 4)	nav	nav	4.4	7.9	5.2	nav	nav	neg	0.1	0.1
Spain 5)	42.1	38.7	35.6	31.3	26.4	1.1	1.2	1.2	1.3	1.8
France	2.6	2.9	2.9	2.3	2.4	0.1	0.2	0.2	0.2	0.2
Ireland	77.7	78.7	72.5	72.3	68.7	0.3	1.3	1.6	2.7	4.1
Italy	2.9	3.7	3.2	2.9	3.1	0.1	0.1	0.1	0.2	0.2
Luxembourg	12.8	9.5	8.0	7.85	7.1	5.4	4.0	4.0	4.4	5.1
Netherlands 4)	0.1	0.1	0.1	0.0	neg	1.2	1.4	1.4	1.4	1.6
Austria 6)	3.0	2.3	1.8	1.6	1.4	0.4	0.5	0.6	0.7	1.0
Portugal 7)	6.8	13.3	15.0	15.6	14	0.2	0.4	0.5	0.6	0.7
Finland 4)	7.4	6.8	7.6	6.5	3.9	0.8	0.9	1.0	1.1	1.1
Sweden	0.4	0.3	0.2	0.2	0.2	1.5	1.9	2.2	2.8	5.3
United Kingdom	4.4	2.8	2.5	2.2	2.2	0.3	0.2	0.2	0.2	0.2
EU 8)	10.2	8.3	7.5	6.9	6.4	0.4	0.5	0.5	0.6	0.7
Euro area 8), 9)	11.3	9.3	8.6	7.7	7.2	0.4	0.5	0.5	0.5	0.6

Table 10.6 (continued)

	Credit transfers					Direct debit				
	1998	1999	2000	2001	2002	1998	1999	2000	2001	2002
Belgium	96.3	98.9	99.0	99.0	98.7	0.3	0.3	0.3	0.3	0.3
Denmark	58.4	64.3	66.8	67.8	69.6	7.3	8.1	8.6	9.3	9.6
Germany 1), 2)	75.6	83.1	85.6	84.7	85.4	13.7	12.8	10.8	12.1	11.8
Greece 3), 4)	nav	nav	95.5	92.0	94.7	nav	nav	neg	0.1	0.1
Spain 5)	46.2	47.2	45.8	54.3	56.1	10.6	12.9	17.5	13.2	15.7
France	96.6	96.2	96.2	96.8	96.7	0.6	0.7	0.8	0.7	0.8
Ireland	19.0	15.9	17.9	14.3	16.3	3.1	4.1	8.0	10.7	10.9
Italy	96.2	94.6	95.1	95.1	94.6	0.9	1.6	1.6	1.9	2.1
Luxembourg	81.1	85.9	87.2	86.6	85.7	0.6	0.6	0.7	1.2	2.1
Netherlands 4)	93.8	92.9	93.3	93.6	93.1	4.9	5.5	5.3	5.0	5.3
Austria 6)	85.3	89.2	89.7	90.2	91.0	11.3	8.1	7.9	7.4	6.6
Portugal 7)	92.6	85.4	83.4	82.6	84.5	0.5	0.9	1.0	1.1	0.8
Finland 4)	90.8	91.2	90.2	91.3	93.7	1.1	1.1	1.3	1.2	1.3
Sweden	96.0	95.2	94.8	94.1	90.8	2.1	2.5	2.7	2.9	3.7
United Kingdom	94.4	96.3	96.6	97.0	96.9	1.0	0.7	0.7	0.6	0.7
EU 8)	84.1	85.8	86.6	87.3	87.6	5.3	5.4	5.5	5.3	5.5
Euro area 8), 9)	82.1	83.8	84.4	85.6	86.1	13.0	13.4	13.6	12.7	13.3

Table 10.6 (continued)

	Card-based e-money				
	1998	1999	2000	2001	2002
Belgium	0.001	0.0011	0.001	0.002	0.005
Denmark	0.0012	0.0016	0.0017	0.0017	0.0016
Germany 1), 2)	neg	neg	neg	neg	neg
Greece 3), 4)	nap	nap	nap	nap	nap
Spain 5)	0.0004	0.0003	0.0002	0.0001	0.0001
France	nap	nav	nav	neg	neg
Ireland	neg	neg	nap	nap	nap
Italy	neg	neg	neg	neg	neg
Luxembourg	nap	neg	neg	neg	neg
Netherlands 4)	0.002	0.0027	0.0024	0.0024	0.0062
Austria 6)	0.0008	0.001	0.0011	0.0021	0.0111
Portugal 7)	0.0002	0.0002	0.0002	0.0001	nav
Finland 4)	neg	neg	neg	neg	neg
Sweden	0.002	0.0033	0.0021	0.0011	0.0015
United Kingdom	neg	nav	nav	nav	nav
EU 8)	0.001	0.0012	0.001	0.001	0.003
Euro area 8), 9)	0.0009	0.0009	0.0008	0.0009	0.0033

Notes:

- 1) Payments by credit cards: from 2000 onwards, the figure includes retailer card transactions.
- 2) Direct debits: debit card transactions are not included under this item but are shown under "Payments by debit cards".
- 3) All checks for which the acquiring bank is different from the issuing bank.
- 4) The figures for payments by credit/debit cards include payments by cards with a delayed debit function.
- 5) This table does not include data relating to bills of exchange, travelers checks and other documents.
- 6) Credit cards does not include delayed debit cards (charge cards); credit transfers and direct debits do not include items initiated by banks; these data are not available.
- 7) This table does not include data related to bills of exchange.
- 8) Total excluding countries for which data are not available.
- 9) Following its entry to the euro area, the figures for 2001 onwards include Greece.

Source: ECB (2004)

Table 10.7**How U.S. consumers made in-store payments**

In percentages

Year	Cash	Check	Credit card	Other	Debit card
2003	32	15	21	2	31
2001	33	18	21	2	26
1999	39	18	22	nav	21

Note: The sums do not add up to 100 probably due to rounding.

Source: Dove Consulting, December 2003, available from ePayNews (<http://www.epaynews.com/statistics/transactions.html>, accessed March 22, 2005)

Table 10.8**Indicators of use of various cashless payment instruments: volume of transactions
(USA)**

In millions

	1999	2000	2001	2002	2003
Checks paid 1)	43,423.2	41,900.0	40,166.7	38,433.3	36,700.0
Payments by card	22,106.4	25,734.9	29,542.8	33,441.3	36,755.8
of which:					
Debit 2)	7,505.8	9,550.1	12,452.7	15,584.5	18,442.4
Credit 3)	14,600.6	16,184.8	17,090.1	17,856.8	18,313.4
Paperless credit transfers	3,167.8	3,486.1	3,890.3	3,976.9	4,181.9
of which:					
CHIPS	57.3	59.8	60.4	63.3	64.5
Fedwire 4)	102.8	108.3	112.5	115.0	123.3
Federal Reserve ACH 5), 6)	2,680.2	2,937.0	3,253.0	3,418.7	3,577.7
Private ACH 7)	327.5	381.0	464.4	379.9	416.4
Direct debits	1,676.9	1,947.3	2,385.4	2,760.7	3,345.9
of which:					
Federal Reserve ACH 5), 6)	1,472.0	1,713.5	2,095.7	2,450.6	2,925.4
Private ACH 7)	204.9	233.8	289.7	310.1	420.5
Electronic money 8)	nav	nav	nav	nav	nav
of which:					
Card-based	nav	nav	nav	nav	nav
Network-based	nav	nav	nav	nav	nav
Total	70,374.3	73,068.3	75,985.2	78,612.2	80,983.6
Memo:					
“On-us” ACH	1,432.3	1,674.7	1,958.1	2,270.4	2,485.0

Notes:

1) Includes personal, commercial, government and travelers checks, and commercial and postal money orders. A Federal Reserve study of the check clearing system, published in December 2004, estimated that the number of checks paid in the United States was 41,900 million in 2000 and 36,700 million in 2003. An earlier Federal Reserve study, published in August 2002, estimated that the number of checks paid in the United States was 49,516 million in 1995. Figures for other years are derived from these estimates.

■ 2) Includes PIN-based (online) and signature-based (offline) transactions. ■ 3) Includes figures for Visa, MasterCard, Discover, American Express, Diners Club, retailer and oil company cards. ■ 4) Volume of Fedwire funds transfers. Does not include securities transfers over Fedwire. ■ 5) Includes all government and commercial debit and credit transfers. ■ 6) Includes transfers sent by private automated clearing houses to the Federal Reserve for transmission to the receiving depository institution. ■ 7) Does not include “on us” ACH transfers. ■ 8) E-money products have not been widely adopted in the United States. In this reporting period, e-money transaction volume is negligible relative to other cashless payment instruments. ■ The sources of data are Federal Reserve; The Nilson Report (HSN Consultants Inc, Oxnard, CA); and Clearing House Interbank Payments.

Source: CPSS (2005)

Table 10.9**Indicators of use of various cashless payment instruments: value of transactions
(USA)**

In \$ billions

	1999	2000	2001	2002	2003
Checks paid 1)	39,966.7	39,800.0	39,633.3	39,466.7	39,300.0
Payments by card	1,586.5	1,854.6	2,086.2	2,308.0	2,530.9
of which:					
Debit 2)	322.6	419.1	571.8	699.7	819.8
Credit 3)	1,263.9	1,435.5	1,514.4	1,608.3	1,711.1
Paperless credit transfers	648,660.3	680,029.4	744,318.0	731,114.6	773,229.8
of which:					
CHIPS	297,933.7	292,147.1	311,706.6	315,708.5	326,560.6
Fedwire 4)	343,381.7	379,756.4	423,606.4	405,761.8	436,706.3
Federal Reserve ACH 5), 6)	6,324.5	6,957.3	7,745.8	8,331.8	8,581.6
Private ACH	1,020.4	1,168.6	1,259.2	1,312.5	1,381.3
Direct debits	8,081.3	8,315.7	8,631.5	8,597.3	9,263.4
of which:					
Federal Reserve ACH 5), 6)	6,771.2	7,067.1	7,490.0	7,514.9	8,180.6
Private ACH	1,310.1	1,248.6	1,141.5	1,082.4	1,082.8
Electronic money 7)	nav	nav	nav	nav	nav
of which:					
Card-based	nav	nav	nav	nav	nav
Network-based	nav	nav	nav	nav	nav
Total	698,294.8	729,999.7	794,669.0	781,486.6	824,324.1
Memo:					
“On-us” ACH	4,545.3	4,966.8	5,421.4	6,121.2	6,700.0

Notes:

1) Includes personal, commercial, government and travelers checks, and commercial and postal money orders. A Federal Reserve study of the check clearing system, published in December 2004, estimated that the value of checks paid in the United States was USD 39,800 billion in 2000 and USD 39,300 billion in 2003. Figures for other years are derived from these estimates. ■ 2) Includes PIN-based (online) and signature-based (offline) transactions. ■ 3) Includes figures for Visa, MasterCard, Discover, American Express, Diners Club, retailer and oil company cards. ■ 4) Value of Fedwire funds transfers. Does not include securities transfers over Fedwire. ■ 5) Includes all government and commercial debit and credit transfers. ■ 6) Includes the value of transfers sent by private automated clearing houses to the Federal Reserve for transmission to the receiving depository institution. ■ 7) E-money products have not been widely adopted in the United States. In this reporting period, e-money transaction value is negligible relative to other cashless payment instruments. ■ The sources of data are Federal Reserve; The Nilson Report (HSN Consultants Inc, Oxnard, CA); Clearing House Interbank Payments System; and National Automated Clearing House Association.

Source: CPSS (2005)

Table 10.10**Consumer payment media used at the POS**

Mechanism	Percentage of consumers that used the mechanism	Average number of payments per month
Cash	99	10.9
Check	86	5.7
Credit card	83	6.7
PIN debit	50	4.7
Signature debit	44	3.5
Prepaid card	17	0.3
Check truncation	6	0.5

Source: American Banker, December 2001, available from ePayNews (<http://www.epaynews.com/statistics/purchases.html>, accessed March 22, 2005)

Table 10.11**Comparison of payment methods**

Payment method	Acceptance	Fees	Fraud risk	Duration	Cross-border?
Credit card	High	High	Very high	Real-time	Yes
Bank transfer	Low	Low	Low	2–3 days	Limited
Direct debit	Medium/Low	Low	Very high	2–3 days	No
Debit card	Medium/Low	Medium/High	High	Real-time	No
E-money 1)	Low	Medium/low	None 2)	Real-time	Yes

Notes:

- 1) The source focuses on P2P online payment services and includes them in e-money.
- 2) The fraud risk of robust e-money schemes is arguably higher than the fraud risk of traditional instruments when they are used on the Internet. However, David Roe's optimistic perception of P2Ps contrasts with the one of the author.

Source: Roe (2003)

Table 10.12 Cross-border retail payments in 1998

In \$ billions

From/To	Americas	Europe	Asia
Americas	41	8	4
Europe	10	142	6
Asia	3	5	32

Note: Covers non-cash, online and offline payments.

Source: Boston Consulting Group quoted in Selby (2002)

Table 10.13 Prepaid subscribers in world regions (2001–2004)

In millions

Region	2001	2002	2003	2004
EMEA	258.1	320.9	375.6	427.6
Asia Pacific	27.7	40.7	55.4	71.3
Greater China	55.4	93.4	119.2	156.8
North America	12.5	15.7	18.4	20.3
South America	63.2	86.1	109.7	133
Worldwide	416.2	556.8	678.3	809

Source: EMC (<http://www.emc-database.com>), date not provided, available from ePayNews (<http://www.epaynews.com/statistics/mcommstats.html>, accessed March 22, 2005)

Table 10.14 Micro- and macro-payment estimates (2000–2005)

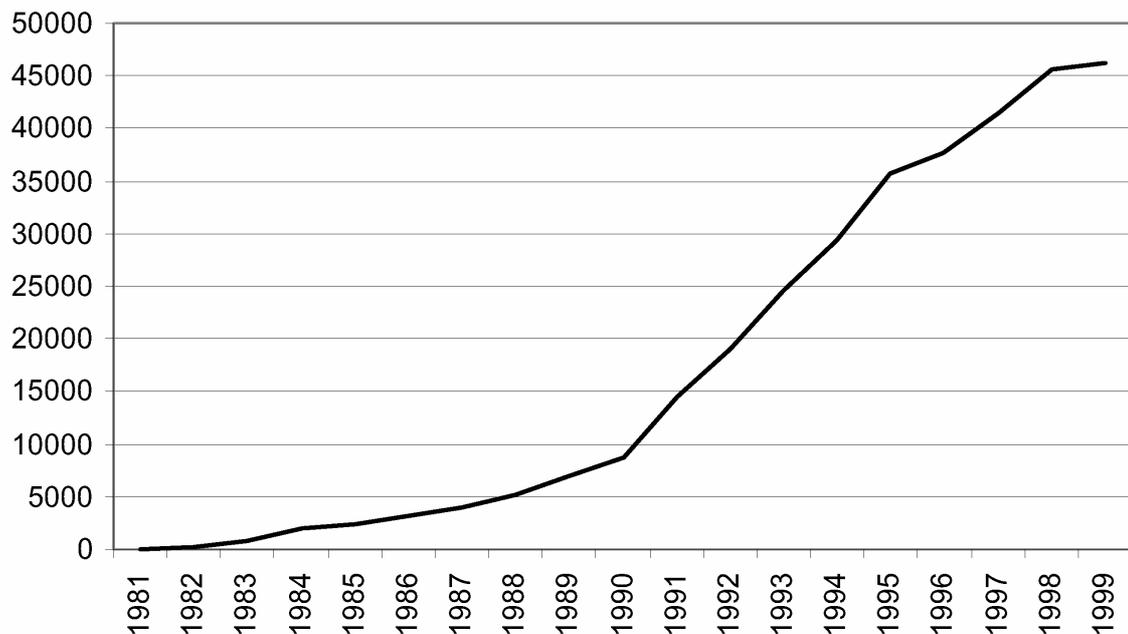
In € millions

	2000	2001	2002	2003	2004	2005
Mobile content	51	317	861	1,750	3,485	5,146
Out of band micro 1) (<€10)	<1	<1	<1	4	12	27
Out of band macro (>€10)	5	24	162	619	1,890	3,014
Proximity micro 2)	26	87	423	3,270	4,440	5,005
Proximity macro	19	67	314	1,387	5,341	12,674
Total	101	494	1,761	7,030	15,069	25,866

Notes:

- 1) Out-of-band payments use the wireless device as a convenient and secure means of paying for goods that are consumed through another channel. For example, the transaction might take place over the wired Internet, interactive TV, a call centre etc. while the payment takes place via the mobile device. In comparison, in-band payments refer to digital content that will be consumed on the wireless network, and includes infotainment, ringtones and logos, MP3s, etc.
- 2) Proximity payments apply when the mobile device is used to pay at a point of sale, and includes stored POS, vending and ticketing, tolls, parking, taxis, etc.

Source: “Mobile payment’s slow start” (Forrester Research, May 2001) quoted in GSM MoU Association (2002)

Graph 10.1 The spread of ATMs in Germany

Source: “Bundesverband deutscher Banken” quoted in Krueger (2002), reprint