E-Payments Evolution

Monika E. Hartmann[1]

European Central Bank, Frankfurt

1 Introduction

Paying for an article with a click of your mouse; settling an auction purchase via your e-mail account; buying an electronic ticket using your mobile phone. Ways in which people can pay electronically are becoming more and more sophisticated, leading to new options for transferring (or even depositing) money. Innovative payment services try to cater for new markets and needs. They may promise high convenience, flexible use, high transaction speed and/or lower fees than traditional payment instruments. However, they have to compete with legacy solutions and comply with rules and regulations which often vary from country to country.

Outside and within the common market of the European Union, and even within the single currency area of the Euro, payments innovation is always related to specific backgrounds: it addresses the diversity of needs and weaknesses of grown infrastructures. Payment innovators that are able to offer solutions with a significantly advantageous profile will have a chance to win against the inertia of long-established payment habits and/or payment procedures. However, many solutions do not succeed in reaching a critical mass of users – maybe with the exception of monopolistic infrastructures and services that can dictate the way people pay. The prospects for and challenges faced by innovative payment services and the potential contribution of such services to European market integration are at the core of the work of ePSO, the e-Payment System Observatory, which has been operated by the European Central Bank since 2003 (ECB 2005a). On the basis of its statutory responsibility "to promote the smooth operation of payment systems", the Eurosystem aims at providing a forum for co-operation between the stakeholders at the European level, and at offering analysis and statistics to support the further development of more efficient and secure payment mechanisms by the markets. Some recent observations on innovation in retail payments in Europe will be sketched in the following paragraphs. The focus will be on selected developments in the area of E-Payments. In principle, E-Payments may be defined as all payments that are initiated, processed and received electronically. One can distin-

[1] The views expressed in this article are the author's and do not necessarily reflect those of the European Central Bank.

guish between E-Commerce retail payments (business-to-consumer or B2C payments) and E-Payments amongst consumers (Private-to-Private or P2P payments), as well as electronic adoptions of "traditional" banking services (electronic transactions between a bank and its customers, e.g. for initiating credit transfers or authorising direct debits). However, there are overlaps between these categories. For instance, E-Banking services can also serve payment purposes between consumers and businesses or between private persons.

2 High technology, market specifics and payments innovation

The technological progress in information technology and communications (ITC) offers a vast potential for new services, from the adoption of existing payment instruments to the capabilities and requirements of these new media and communication channels to the introduction of fundamentally new concepts for payment initiation, processing and receipt. Figure 1 illustrates the expansion of new ITC like the internet and mobile phones across Europe. In some countries the majority of citizens already have regular access to internet services. However, the expansion of mobile networks is even more advanced. A few countries have already reached a stage where the average citizen owns more than one mobile phone, while in only very few EU countries has the penetration level not yet reached an average coverage of two-thirds of the population.

However, innovation in payments faces some particular challenges. Payment services are a special market with strong network effects, specific roles, niches and rules. It is also highly regulated, since closely related with money and finance. Nevertheless, payment services are not purely the domain of banks any more (and in some countries they never were): wherever there are uncovered niches, non- and near banks offer their products and services. However, such payment innovators that come from outside the banking industry also need to be connected to the existing banking infrastructure and payment systems, in order to allow funding and withdrawals out of their schemes. They may face entry barriers, especially if they aim at international expansion of their services.

Furthermore, some low-tech payment products may be dominant enough to prevent the broad usage of innovative schemes. The development track in the payments industry does not automatically lead from low tech to high tech, like in the production industry. The example of cash indicates that low-tech alternatives can exist for a very long time in parallel with more innovative schemes, due to a specific set of characteristics that seems to be difficult to substitute. It is remarkable that the introduction of innovative payment instruments during the last centuries was normally accompanied by the expectation that cash might disappear, but that any such expectation has so far proven premature. For instance, John Fullarton discussed the potential substitution of banknotes by cheques in the year 1845. Similar debates occured when the credit card was introduced in the middle of the twentieth century, during the introduction of debit cards in the 1980s and again

during the 1990s in the context of evolving E-Money and internet payment schemes (Hartmann 2000).

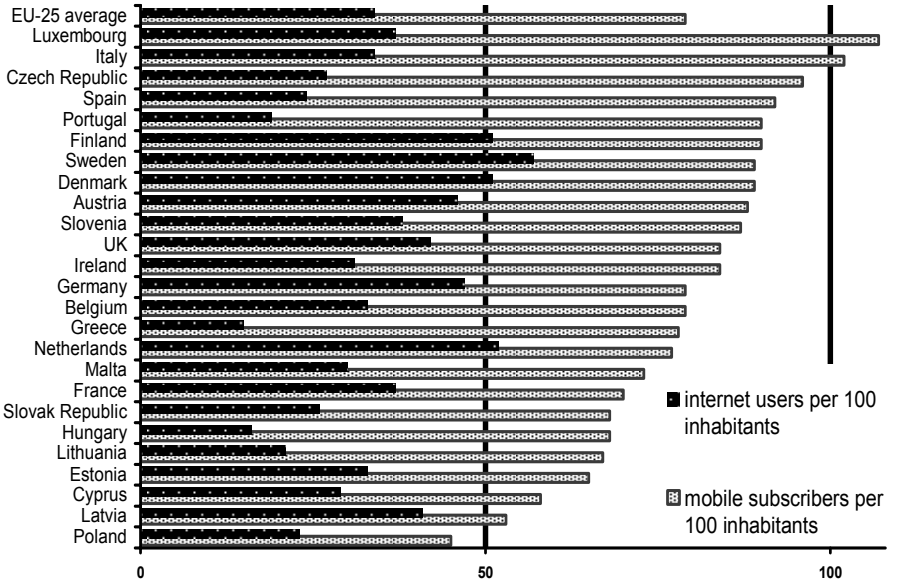

Fig. 1. Penetration rates of internet and mobile phone services in the European Union

The following section will discuss the evolution of E-Money, mobile payments and innovative banking services as three prominent innovation areas.

3 Developments in E-Money, mobile payments and innovative banking services

3.1 Electronic money

3.1.1 Definition

According to the "Report on electronic money" published by the ECB in August 1998, electronic money was "broadly defined as an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings other than the issuer without necessarily involving bank accounts in the transaction, but acting as a prepaid bearer instrument" (ECB 2000). However, this definition no longer covers all types of schemes that are nowadays subsumed as E-Money in the EU (see the following section on generations and spread in Europe).

A legal definition of electronic money is provided in Article 1 of the European Parliament and Council Directive 2000/46/EC on the taking up, pursuit of and prudential supervision of the business of electronic money institutions (E-Money

Directive, European Parliament 2000). According to this definition, "electronic money shall mean monetary value as represented by a claim on the issuer which is: (i) stored on an electronic device; (ii) issued on receipt of funds of an amount not less in value than the monetary value issued; (iii) accepted as means of payment by undertakings other than the issuer." The E-Money Directive restricts the business activities of electronic money institutions (ELMIs) to the issuing of electronic money and to closely related financial and non-financial services, e.g. administering of electronic money and of other means of payment, but excluding the granting of any form of credit, and to the storing of data on the electronic device on behalf of other undertakings or public institutions.

3.1.2 Generations and spread in Europe

The first generation of pre-funded electronic payment schemes was based on chip cards, with monetary values protected and managed on the chip of a smart card (hence functioning as an "electronic purse"). Such cards were introduced in the 1980s for single-purpose prepaid services (e.g. for paying for meals at a local canteen, as electronic forms of loyalty schemes or as prepaid telephone cards) and for multiple purposes, especially to replace low-value cash payments at the point of sale. The latter group of schemes was started with high ambitions of becoming a widely accepted substitute for cash, in some cases also for payments between private persons. Consequently, European national central banks considered the values stored on widely accepted multipurpose chip cards to constitute a new type of means of payment called electronic money (EMI 1994). A discussion among public authorities was held to establish if and to what extent such prepaid card schemes might need rules or business restrictions, e.g. in order to safeguard the monetary order. This debate gained further momentum with the emergence of the internet during the 1990s, when a second group of prepaid schemes raised the attention of regulators (BIS/CPSS 1996). This new group of schemes was named software-based E-Money. This type of E-Money is managed by software that needs to be installed at the user's local computer (or any other electronic device with an integrated online communication function). It does not require the use of specific, protected hardware for the storage of E-Money values and is hence less costly to set up than E-Money based on chip cards. Most of the first generation software-based E-Money schemes were however fairly short-lived owing to limited use, and have today nearly vanished from the market.

Meanwhile, new types of E-Money schemes are being introduced, based on enhanced technology. A dominant form of such new E-Money systems is that they are server-based, i.e. funds are not stored locally on chip cards or computers, but kept at a central server (e.g. at the issuer). They promise their users greater convenience and lower set-up costs than the first generation of E-Money. These systems can be divided into two sub-categories: one concept consists of new types of E-Money accounts that can be based on e-mail addresses or mobile phone numbers, etc; the other sells prepaid funds of specified amounts by providing a simple access number to the funds that can be entered for spending. Most of these newer generations of pre-funded payment schemes may not fit exactly into the initial

definitions of E-Money systems. However, the categories of card and software-based schemes are still officially in use, e.g. for data collection and monetary statistics (Fig. 2).

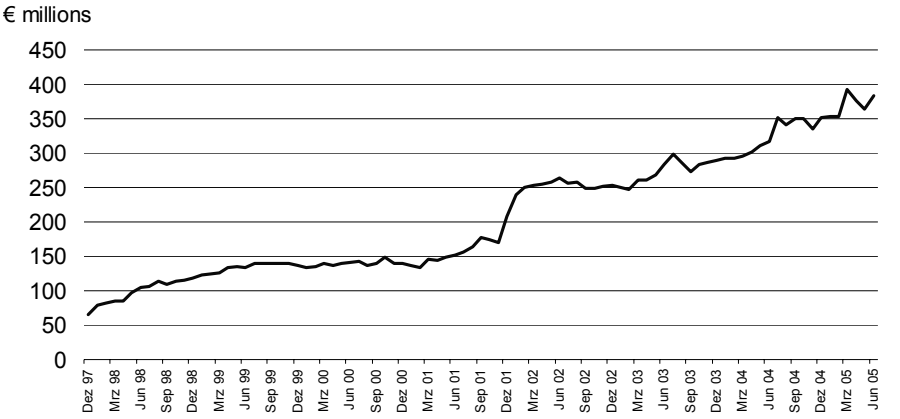

Fig. 2. Euro area E-Money volume in EUR millions (end of month, not seasonally adjusted) (ECB 2005b)

The currently outstanding values of E-Money schemes in the Euro area presented above equal to or less than 0.1% of Euro cash in circulation. There was a marked increase in E-Money issuance right before the euro changeover, and there was also some increase during the first halves of 2003 to 2005. However, the increase in transaction volumes reported until 2003 was lower than the according growth rates of other payment instruments (e.g. cards, direct debits). The number of E-Money transactions effected in the EU-25 in 2003 represented a share of 0.5% of all cashless payments (ECB 2005c).

3.1.3 Monetary policy issues

From a monetary policy perspective the diffusion of E-Money may imply certain risks. The most prominently discussed issues are:

- The E-Money issuance might decrease demand for banknotes and coins (one of the autonomous factors in forecasting the structural liquidity position for the banking sector) and traditional bank deposits (the element of the reserve base). One consequence might be instability of money demand, with detrimental effects on the ability of central banks to formulate and conduct monetary policy. The eroding demand for banknotes and coins may lead to the shrinkage of the central bank balance sheet and the structural liquidity deficit, thereby complicating monetary policy implementation.
- Moreover, there is a possibility of a reduction of seigniorage income arising from a lower demand for banknotes, given substitution into E-Money as a means of payment. This may lead to a reduction of central bank revenue and, ultimately, to the limitation of central bank financial independence.

However, the limited diffusion of E-Money in European economies and, especially, the existence of European directives on this matter seem to limit the risks described above[2]. At the same time, the legislative framework for E-Money is under review (European Commission 2005): its effectiveness is to be discussed, especially for avoiding certain risks and for fostering the pan-European expansion of innovative payment services, but also its neutrality regarding technological solutions and regarding competitors of varying industry origin. The future European E-Money legislation also needs to fit to the concept of the New Legal Framework for Payment Services (NLF), a project by the European Commission (European Commission 2004 – see the article of Julian Langner later in this edition).

3.1.4 Global spread of E-Money

A look at the market developments of E-Money and prepaid services in other parts of the world may provide additional insight.

- *Prepaid services in the United States vs the European Union.* While the European legistlator and the Eurosystem set up a framework for the issuance of E-Money during the late 1990s, the US federal legislators decided against any regulation of prepaid services, due to concerns of permature regulation of a market that is still at an early stage (Hartmann 2000). When comparing the situation in the EU and the USA today, both markets have had a similarly reluctant start. Meanwhile, the market opportunities of prepaid services are again being discussed more vividly in the US, especially the socio-economic objective of providing more efficient payment services to the parts of the population without bank accounts (see, e.g. Digital Transactions 2005).
- *World leaders in Asia: example Singapore.* The payment statistics from Singapore reveal figures that may at first sight be interpreted as a silent E-Money revolution: the volume share of card-based E-Money transactions reported has increased to a share of 85.3% of all cashless transactions within just a few years (BIS/CPSS 2005 – Red Book). However, does this also imply that Singapore is the first country that has arrived at a cashless society? The answer is no. First, it should be noted that the total figure of cashless payment instruments for Singapore in the Red Book does not include the volume of credit card transactions. The overall share of E-Money transactions would be lower if these card transaction volumes were taken into account. Second, the high demand for E-Money has not decreased the demand for cash. According to the Monetary Authority of Singapore the strong growth of E-Money (called stored value facilities according to the legal framework in Singapore) was mainly due to the introduction of the transit-based, contactless EZ-Link card, as competitor to the already established NETS CashCard transit payment card. This suggests more a replacement of cash use for transit facilities rather than the strong decrease in the usage of cash generally for small value payments. Consumers in Singapore and else-

[2] For a detailed monetary policy discussion see the article of Stefan W. Schmitz (forthcoming in this edition).

where use their E-Money cards for very specific purposes, with the highest growth rates in the transfer business (public transportation, road tolls)[3]. However, the major factors of cash demand are not necessarily fundamentally affected: the value of notes and coin in circulation in Singapore for instance has steadily increased since 2000, despite of – and in parallel to – the strong growth of stored value facilities.

Overall, E-Money seems to remain a relevant topic, whose business opportunities evolve with technological progress – maybe with more success in specific application areas and niche markets than as a general substitute for cash.

3.2 Mobile payments

3.2.1 Definition

Mobile phones and other wireless communication devices offer new ways to access accounts and to use payment services. Payments initiated through mobile phones etc. are called *mobile payments*. Payments made via mobile phones can be conducted to pay for digital goods delivered over the mobile phone, for goods ordered via the internet, and for goods or services bought in the physical world.

3.2.2 Types

There are different technical solutions for mobile payments. For proximity payments, the payment message can also be transmitted contactless, e.g. via radio frequency (for instance in public transportation). For distance payments, the communication usually takes place with the help of SMS or automatic voice messages.

So far, the market for mobile digital goods (ring tones, logos, games, etc.) is well-developed. The dominant payment solutions for these mobile services are premium-rate services (PRS). PRS are settled either via the telephone bill (postpaid) or via prepaid airtime.

A wide variety of advanced mobile payment-related services is conceptually feasible. Apart from the already mentioned premium rate services that are funded from a prepaid airtime account or charged to the regular telephone bill (and hence payment processing, clearing and settlement may be carried out by the mobile network operator), the mobile phone can also be used to initiate payments to be debited from the mobile phone holder's credit/debit card – or directly from his/her bank account. In these cases the mobile network operators have a role in messaging, but not in the clearing and settlement process. Alternatively, transactions can be effected on the basis of electronic money schemes, with electronic purses either integrated into mobile devices or their values stored separately, e.g. on a server or an interoperable chip. The potential role of the operators in this case depends on the question of who issues and redeems the values stored in these E-Purses. The market for all these more advanced types of mobile payment services beyond PRS

[3] For more details see the forthcoming article of Leo Van Hove in this edition.

is at a less developed stage. Many innovative mobile payment schemes are struggling to acquire the necessary number of active customers and attractive merchants, to define common standards and to address emerging security issues. Also, certain functions of mobile banking may be subsumed under M-Payments, for instance credit transfers that are initiated via mobile devices. However, this group could also be regarded as a mere distribution channel for banking services that address specific customer segments.

Mobile payments can rely on different ways of paying and therefore also on different claims. Mobile payment schemes either rely directly on commercial bank money, or at least need to have an interface to the banking sector in cases where mobile operators also act as settlement agents. The development of viable cooperation models between banks and mobile providers is therefore a major issue.

3.2.3 Statistical and regulatory issues

As shown in the previous section, mobile payments are a group with various conceptual, technical and organisational options. A subgroup is closely linked to the premium rate service portfolio of the mobile industry. In many other cases M-Payments are built "on top of" existing payment services, i.e. their processing is effected via established payment instruments of the banking industry. This is also the reason why reliable and comprehensive figures on M-Payments can hardly be found: the transactions are either treated as part of the business relationship between the mobile operators and their customers, or only indirectly counted via the payment instruments that are being used for collection purposes in the banking sector. As far as mobile payments are made in the context of premium rate services they are generally not included in any payment statistics – although this is, as already stated, a mature market with high turnovers. As long as M-Payment services are registered as E-Money schemes, they will be reported in figures categorised as E-Money transactions in payment statistics. If the mobile phone is used to debit a payment card account, these M-Payments may appear in the payments statistics as cards payments. In cases where the mobile phone holder authorises a direct debit of his/her bank account, these M-Payments will generally be counted as direct debits in the payments statistics.

The functional, contractual and technical relationships between the parties involved need to be examined in order to understand the general structure of mobile phone services and to what types of constellations the current legal framework for payment services should be applied. The European Commission addressed the specific controversy on the application of the E-Money Directive to prepaid payment services provided by mobile operators. The Commission published a consultation paper on this issue in May 2004. The consultation resulted in a guidance note on the regulatory treatment of mobile operators under the E-Money Directive (European Commission 2005). However, as already discussed, mobile phone operators are not restricted to offering pre-funded payment services to third parties that clearly need to be categorised as E-Money as defined in the European framework. The operators can also choose many different functional roles along value and transaction chains (ECB 2004).

3.2.4 Global spread

The high penetration rate of mobile and wireless networks seems to imply a vast market potential for mobile payment services. The increasing popularity of mobile phones, personal digital assistants and other devices for wireless communication might offer potential benefits to users, e.g. as a convenient means of access to online services and customer-specific mobile services – which often include payment functions. Mobile devices could be well positioned for this, as they are personalised, carried around permanently, designed to be connected, and have a penetration level even higher than internet usage in Europe (as was already shown in Fig. 1). However, the development of complex mobile payment schemes that require cooperation between the banking and mobile industries is often challenging, and if viable business and cooperation models are achieved, the acceptance by users might nevertheless develop only reluctantly – similar to the first years of E-Money issuance in Europe.

There is so far little progress visible in the standardisation and interoperability of national mobile payment solutions or in the development of concepts for the European market. Simpay, an initiative to create a new European-wide mobile payment service that had been launched by a group of mobile network operators, was discontinued in mid-2005. National mobile payment providers that have recently expressed or confirmed intentions of expanding their mobile payment services beyond their home market are infrequent, too. At the same time, in other parts of the world (especially in Asia) and in certain customer segments, new types of M-Payment services are becoming increasingly popular. For example, mobile phones are being used for effecting money transfers between industrial and developing countries. Generally such payments are initiated by foreign working citizens who want to transfer parts of their income to recipients in their home countries and make use of specialised mobile money transfer services. They transfer the payment amount either by card or in cash into such a transfer system, which passes it on to a specified mobile phone account in the home country. In these home countries – like the Philippines or Mexico – large shares of the population do not have a bank account, but increasingly often they can afford the acquisition of a prepaid mobile phone. Amounts transferred to the mobile phone account may be used for phone calls, be kept on deposit or withdrawn as cash.

This last example shows that the mobile phone can become a versatile tool to support various payments functions in many different ways – provided the relevant business models are built on market segments with sufficient demand.

3.3 Innovative banking services

3.3.1 Definition

Banking services may be roughly defined as the communication and the distribution of banking products between a bank and its customers. Innovation may, for instance, occur in the form of new banking products, new procedures or new communication methods. Two examples come to mind. First, internet banking be-

tween banks and consumers has become an important distribution channel for banking services, including – and beyond – retail payment transactions. This applies to certain groups of customers in the EU-25 countries with high internet penetration ratios (Fig. 1). Second, the opportunities of mobile banking have already been briefly mentioned in the previous section. Both banking service categories can be regarded as recent elements in the context of an impressive history of innovation banking and payment services, as presented by Ewald Judt in this edition. A specific payment concept that builds on online banking services, but goes beyond the bilateral customer-bank relationship, will be described in the following paragraph.

3.3.2 Online banking payment solutions at merchant websites

There are many market solutions which facilitate payment transactions from consumers to online merchants, but few of them have gained nationwide user acceptance (or even offer pan-European availability). This issue is addressed by providers of payment portals or integrated payment services. These specialists offer access to the services of different payment networks, hence increasing the number of eligible payment options between payer and payee. Access to such services may be effected via internet browsers or mobile phones. For high convenience these services are embedded in the online shopping process, e.g. via an automatic popup window connecting to the service provider and already containing all necessary transaction details. The customer is invited to choose a payment option and provide his account details. The completed transaction data set will be routed to the relevant payment service provider for authorisation. After successful payment authorisation the bank (or other payment service provider) confirms the payment to the merchant so that the purchase transaction can be completed. Then the customer is redirected to the merchant's website. Innovative features of this type of service are the integration of bank-based, credit card-based and other types of payment services at the merchant's websites. Challenges are the creation of interoperability or standards that allow integrative services, as well as the reduction of fraud risks during the automated routing steps (for information on payment security issues like phishing attacks see ECB 2004). Banks in countries with a developed online banking infrastructure and a high popularity of credit transfers (or similarly direct debits) may be regarded as natural candidates to provide such integrated services. The automatic connection to the payer's bank during an online purchase promises advantages in convenience in comparison to a separate initiation of a credit transfer: the payment amount, recipient account and other transaction details do not need to be specified again. However, it requires the setup of common rules and standards for online banking, to enable as many bank account holders as possible to access the service via a similar procedure. Only the banking sectors in a few European countries have achieved interoperability agreements or even standards that facilitate such integrated bank payments from online merchant

websites[4]. At an even earlier stage of development are integrated E-Payment services that enable not only national, but also pan-European transactions between online bank accounts. The E-Payments Task Force of the European Payments Council (EPC) is working on such a European solution. The EPC is a pan-European banking body that aims at bringing about SEPA, the Single Euro Payments Area, by 2010. It sets the speed of progress in this direction and is the place where European banks make common decisions, e.g. on standards (EPC 2005).

4 Conclusions

- E-Payment evolution across Europe varies in terms of form and speed. There are large differences between countries in terms of existing infrastructure and user habits. Gradual innovation is often based on existing banking and card infrastructure. However, more "revolutionary" concepts – such as E-Money and mobile schemes – are appearing in some countries. The technological basis for innovative payment solutions is available to more of the population (access to internet and mobile networks).
- Innovation in payments faces some particular challenges. Payment services are a special market with strong network effects, specific roles, niches and rules. They are also highly regulated, since they are closely related with money and finance. Nevertheless, payment services are not purely the domain of banks: wherever there are uncovered niches non- and near-banks offer their products and services. However, the road of payments evolution is bumpy: the development track in the payments industry does not automatically lead from low tech to high tech. The example of cash indicates that low-tech alternatives can exist for a very long time in parallel with more innovative schemes, due to a specific set of characteristics that seems to be difficult to substitute.
- E-Money usage has seen some increase in recent years, but at least in Europe the growth rates are much lower than those of other payment instruments. Specific market segments, like the transit sector, however, could deliver a fast increase in the future, as the example of Singapore indicates. The almost five-years-old legal framework for E-Money in Europe is currently under review.
- Mobile payments are a group with various conceptual, technical and organisational options. A subgroup is closely linked to the premium rate service portfolio of the mobile industry. In many other cases M-Payments are built "on top of" existing payment services, i.e. their processing is effected via established payment instruments of the banking industry. This is also the reason why reliable and comprehensive figures on M-Payments can hardly be found. The mobile phone can become a versatile tool to support various payments functions in many different ways – provided the according business models are built on market segments with sufficient demand.

[4] One example is the Austrian eps e-payment standard which is explained by Joachim Geisler later in this edition.

- Only the banking sectors in a few European countries have achieved interoperability agreements or even standards that facilitate integrated bank payments from online merchant websites. At an even earlier stage of development are integrated E-Payment services that enable not only national, but also pan-European transactions between online bank accounts.
- More information on recent developments in E-Payments is available at the e-Payment Systems Observatory website operated by the European Central Bank (ECB 2005a).

References

BIS/CPSS (1996) Implications for central banks of the development of electronic money. Bank for International Settlements, Basel

BIS/CPSS (2005) Statistics on payment and settlement systems in selected countries – figures for 2003 (Red Book). CPSS Publications No. 66. Bank for International Settlements, Basel, http://www.bis.org/publ/cpss66.htm

Digital Transactions (2005) The promise of stored value, title story of magazine. Volume 2, number 4–July/August 2005, http://www.digitaltransactions.net/files/DT_v2n4.pdf

ECB (2000) Issues arising from the emergence of electronic money. Monthly Bulletin, November 2000. European Central Bank, Frankfurt

ECB (2004) E-payments without frontiers, issues paper and conference documentation. European Central Bank, Frankfurt, http://www.ecb.int/events/conferences/html/epayments2004.en.html#intro

ECB (2005a) ePSO website of the European Central Bank. Frankfurt, www.e-pso.info

ECB (2005b) Monetary statistics – electronic money, as of August 2005. European Central Bank, Frankfurt, http://www.ecb.int/stats/money/aggregates/emon/html/index.en.html

ECB (2005c) Blue Book Addendum incorporating 2003 figures. European Central Bank, Frankfurt

EMI (1994) Report on prepaid cards. European Monetary Institute, Frankfurt

EPC (2005) European Payments Council website. http://www.europeanpaymentscouncil.org

European Commission (2004) New legal framework website. European Commission, Brussels, http://europa.eu.int/comm/internal_market/payments/framework/index_en.htm

European Commission (2005) E-money website. European Commission, Brussels, http://europa.eu.int/comm/internal_market/bank/e-money/index_en.htm#emoney

European Parliament (2000) 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, http://europa.eu.int/eur-lex/pri/en/oj/dat/2000/l_275/l_27520001027en00390043.pdf

Hartmann M E (2000) Elektronisches Geld und Geldpolitik – eine Analyse der Wechselwirkungen. Universitätsverlag Karlsruhe, http://www.ubka.uni-karlsruhe.de/vvv/2004/wiwi/6/6.pdf