

# Why e-money still fails\*\*\*

- chances of e-money within a competitive payment instrument market -

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## Abstract

*After a period of euphoria the future of e-money looks much less promising today than even two years ago: No significant market volume, little innovation, hardly any non-bank activities and premature regulation by supervisory authorities. The focus of this analysis are two basic parameters of the current lack of success and the future chances of e-money: **market issues** (supply, demand, cost-benefit-relation to all players, competitive environment of other payment instruments, etc.) and **regulatory issues** (degree of regulative restrictions to the suppliers, to the product itself, to its usage, etc.). The birthplace of e-money was a non-bank environment. It is shown that massive reactions of the banking community (central banks included) deeply influenced the market development of this new money. Focussing on market issues, the business case for e-money is analysed. On the issuer side particular attention is paid to the problem of counterfeiting and systemic risk. On the user side, it is shown that the choice of medium of payment is heavily influenced by the type of underlying transaction.*

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## 1. Introduction

After a period of euphoria the future of e-money looks much less promising today than even two years ago. Many new ideas never got beyond the initial pilot project. Prominent firms like DigiCash, that had invented celebrated products went bankrupt. These sobering facts provide an incentive to do what should have been done long ago: a thorough analysis of the business case and market chances of e-money.

E-money is the (temporary) end of monetary evolution, that can be characterised as a process of de-materialisation. However, the evolution of money from archaic times until now has not been driven by unhampered market forces. While autonomous technical progress has been (and is) important the evolution of money has also been driven by an inter-action between regulation and innovation (innovation as re-action to bypass regulation or regulation as re-action to innovation). In Europe, central banks and supervisory offices have shaped the evolutionary process of e-money since 1994.<sup>1</sup> Thus, regulators are following a "preventive approach" – regulating e-money before it has any market relevance. Such preventive regulation of money is a new chapter in monetary history.<sup>2</sup> Given this rigid approach, the current market share and the chances of e-money in the future depend on two basic parameters:

- **market issues** (supply, demand, cost-benefit-relation to all players, competitive environment of other payment instruments, etc.)
- **regulatory issues** (degree of regulative restrictions to the suppliers, to the product itself, to its usage, etc.)

An explanation of the current lack of success of e-money has to take both parameters into account.

## 2. Definition of e-money

A proper definition of e-money is important for an analysis of the competitive position of e-money in the market for payment instruments. From an **economic** point of view the interesting question is: What is really new about e-money in comparison to traditional types of money and payment instruments? At the current embryonic state of development it is hard to give a precise economic definition of e-money. Still, some preliminary conclusions about the nature of e-money can be drawn.

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<sup>1</sup> See EMI (1994), ECB (1998) and EU (1998).

<sup>2</sup> In the US, the chairman of the Fed takes a different approach. He warns that rash regulation or over-regulation may prevent the growth of e-money (Greenspan 1997). Similar ideas have been expressed in a report on the UK banking system commissioned by UK Treasury. See Cruickshank (2000).

E-money is monetary value electronic stored on a technical device. The value can be stored on a chipcard, a hard disk or other devices like chip in watches or a car body. The monetary value is like traditional cash in the „hand“ (usually card or pc) of the owner and not on an account at the banks like book money. It is a digital bearer instrument and not a deposit. From **legal** point of view the basic difference to other media of exchange like cheque, debit or credit card is the claim only against the issuer. The payee of e-money has no claim against the payer. So e-money is a non-personal and not account-based claim of the owner against the issuer or a pool of issuers.

### **3. E-Money-Evolution & Regulation**

#### **3.1. Birth of e-money**

To understand the no-success-story of e-money it is necessary to look at the basic milestones of e-money history. We are particularly interested in the interaction between the players (non-banks and banks) and the supervisors (central banks and banking supervisory offices). Our analysis of this interaction process focuses on card-based e-money because software-based e-money is still in the stage of a laboratory product or a pilot project. E-money as prepaid chipcard-related product started in **Japan** in the second part of the eighties. Non-banks like telephone companies (e.g. NTT), rail road companies and retailers started to widen the acceptance of their prepaid cards to other companies. Since 1987 also joint-ventures between different non-bank-companies have been created to issue a common prepaid card with multibranch acceptance (so called U-Card). Some banks joined but without initiator or leader role. The main reasons for non-banks to issue prepaid cards were cash substitution, customer loyalty and discount programs. After establishing a committee of inquiry by Japanese ministry of finance and the Bank of Japan, regulations were introduced in 1990. The new prepaid card law required supervision of issuers of open e-purses (no regulation for two-party-systems and small sized three-party-systems): registration, regular reporting and reserve requirements (non-interest bearing) on prepaid e-money balances (Godschalk 1990). To issue e-money a bank licence was not necessary.

In the beginning of the nineties we see the same development in **Europe**. Non-banks (like Danmont in Denmark) – and not the banks - started with e-money, based on the new chipcard technology by widening the acceptance points of their prepaid cards. Not the banks, but the non-banks

were the first pioneers of chipcard applications and they still are the forerunners<sup>3</sup>.

In midst of this decade two further basic e-money product innovations pop up. David Chaum invented the software-based form of e-money called **ecash** and his company Digicash piloted his cyberbucks with world wide around 10,000 internet users. Anonymous electronic cash created and issued by a non-bank without legal redeemability into the old-fashioned cash of central banks. The second pioneer **Mondex** – a former initiative of some banks in the UK – invented the real electronic purse, ecash on chipcards with the possibility to make payments between cardholders without the necessity of clearing and settlement in old money between the banks. Real e-money was born.

The early birth of e-money embryos by Digicash and Mondex was directly picked up by serious monetary reformers and cranks in the nineties and fiercely discussed world wide in internet chat rooms.

A digital exchange unit could be a basic monetary innovation and the temporary end of monetary evolution. From historical point of view basic innovation always changed the monetary order. The invention of banknotes by London's goldsmiths by issuing receipts for treasuring gold a few centuries ago, for example, marked the beginning of paper money and ultimately the central bank monopoly in money issuance. It is widely believed that the emergence of e-money may have similar far-reaching consequences. The issue of e-money by non-banks based in unregulated off-shore centres poses a threat to the central bank monopoly. Central banks are equally worried by the prospect that e-money may be issued that is not denominated in the national unit of account, like dollar or euro. That could be the rebirth of private currencies and free banking.<sup>4</sup>

But not just free banking supporters see e-money as a “golden opportunity”. The new technology is also interesting for proponents of so-called “barter”-schemes. Decentralisation and privatisation of money could start an innovation process which could generate improved forms of exchange based on real reciprocity between economic subjects, so the reformers expect. It is argued that lack of inflation and interest is a realistic outcome of the competitive evolutionary process and may turn money from evil to server of mankind. These high expectations were nurtured by the local money movement called LETS (Local Exchange Trading Systems) and other so called MFA (Micro Financial Alternatives) based on private currencies. People and small businesses - often supported by local communities - started to buy and sell services and commodities in a self-made local currency. It is not a return to archaic barter, but rather a high sophisticated cashless micro monetary system<sup>5</sup>.

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<sup>3</sup> Only in France the banking industry adopted chipcard technology very early, but without e-purse-functionality.

<sup>4</sup> The issue is discussed in more detail in Krueger/Godschalk (1998). See also Dorn (1997) and Krueger (1999).

<sup>5</sup> Every LETS-participant has his own account started at zero with a certain overdraft facility. Trade between the participants is settled cashless in the local currency which is not

On the whole, the early e-money experiments created both, hope and fear, that the future monetary system might be much more decentralised than the current one.

### **3.2 Reaction of central banks**

The combination of a new payment technology with revolutionary monetary ideas lead to a paradigm change in monetary history. It is easy to imagine what happened in the boardrooms of the central banks, especially in Europe. Worried about the threat to their monopolistic position and their control over the money supply they started to domesticate this monetary faux pas by regulation.

The 1994 EMI-report on prepaid cards stated that only credit institutions should be allowed to issue electronic purses. Central banks agreed that this regulation should be implemented in all EU countries. Some central banks and supervisory offices started to regulate the issue of e-money based on chipcards. E-Money issuance in open three-party systems (acceptance not only by issuer) should only be reserved for traditional banks. Non-banks who were the e-money fore-runners and very early adopters of this technology should only be allowed to issue prepaid cards in a closed two-party system, where the issuer is identical with the service provider and acceptor (like the traditional prepaid callcards of telcos). In Germany the restriction was extended to software based e-money for e-commerce in the internet by 6<sup>th</sup> amendment of the German Banking Act in 1998.<sup>6</sup> But not all central banks in Europe had the same „angst“ like the Bundesbank. Especially the regulators in the UK and Scandinavia decided to wait and see<sup>7</sup>. They joined the laissez-faire position of their colleagues in the USA and Canada. Premature regulation would limit competition and stifle innovation, so the North-American argument.

### **3.3 Reaction of the banks**

Commercial banks reacted to the early e-money initiatives of the non-banks in two ways. Some banks (or bank-owned card organisations or card issuers) took a wait-and-see-position. Their restrained position was confirmed by the disappointed results of market tests. Other banks and banking communities

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redeemable in national currency. The money supply is endogenous adjusted by trade volume. No monetary policy by something like a central bank is necessary. Additional purchasing power within a closed loop will stimulate local economy and that is the main reason for these local or regional currency initiatives. A brief description can be found in Krueger/Godschalk (1998).

<sup>6</sup> Godschalk (1999) provides a critical discussion of this amendment.

<sup>7</sup> See ECB (1998) for overview of e-money regulation within EU countries.

(e.g. in Germany, Austria, Netherlands and Belgium) took a straight-forward-position. The threat of non-bank competition and the enthusiasm for high tech let the banks cast aside a more cautious approach which would have been suggested by the outcome of numerous pilot projects. Their strategy was, and still is, characterised by:

- Wide-scale implementation of the e-purse as mass product
- Standard application on bank issued debitcards (independent from demand of cardholder)
- Acquisition of acceptance points also outside the typical low value transaction segment (like vending machines and public traffic), where terminalised debitcard acceptance already exists
- Nation-wide roll-outs
- E-purse as common product of all the banks (or the participating banks) with identical brand and functionality
- No price competition between issuers on cardholder fee or merchant discount
- E-money units based on national currency (no private tokens)
- E-money based on accountability and traceability with no peer-to-peer-transactions (only exception: Mondex)

This approach can be characterised as a non-competitive mass market strategy with little or no segmentation with respect to region, cardholder, merchant or product. The next consequent step is cross-border functionality of national e-purses within Europe based on CEPS (Common Electronic Purse Standard).

The e-money strategy of the banks is obviously totally different from the strategy followed by non-banks before they were thrown out by regulation. Non-banks segmented the market on issuer and acquirer side of the market.<sup>8</sup> They sold prepaid cards to customers who needed this product. They realised e-money-acceptance at those points-of-sale where cash-handling is a real problem for the customer and the client. They used prepaid cards as loyalty and rebate instrument.

### **3.4 Market failures and success stories**

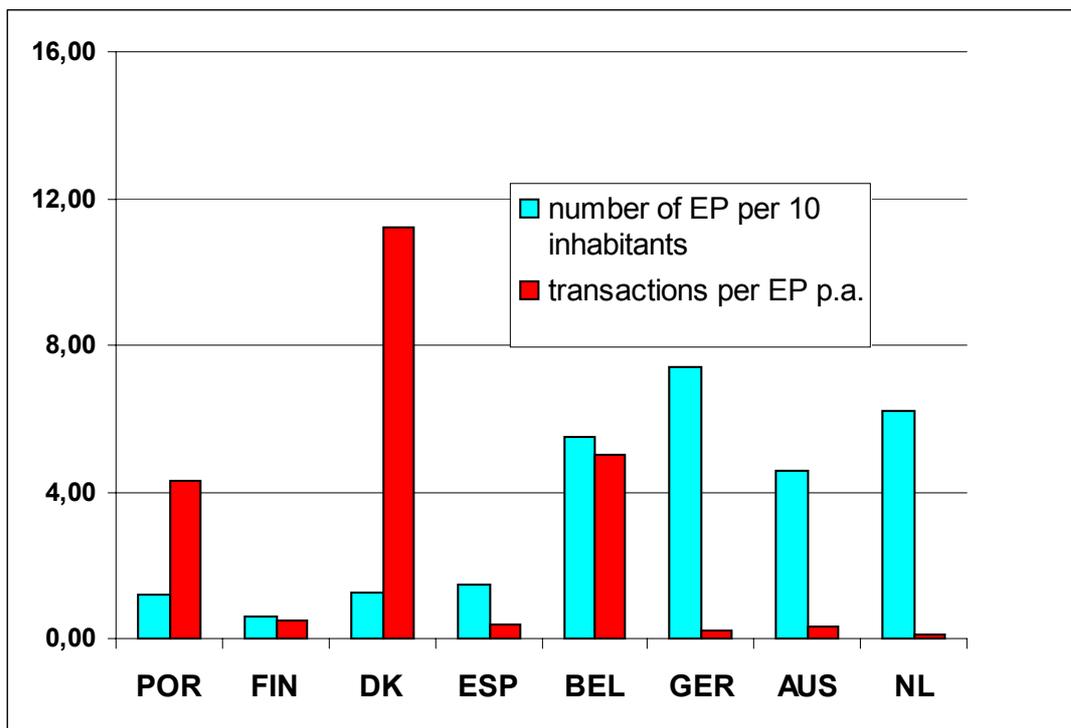
The interaction process between market players and regulators is one of the reasons for the negligible market penetration of e-money. The market development of e-money justifies the laissez-faire position of some regulators. World wide volumes of e-money payments (denominated in national currency within a three party environment) are still hardly worth mentioning. No e-money issuer has a clear business case. There is a morning-after feeling for most e-purse roll-outs in Europe. Even in Germany with a free mass

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<sup>8</sup> For instance, the PayCard targeted local transport operators.

distribution of e-purses on chipcards by the banks (more than 50 million GeldKarten) the volume loaded is stagnating at a level of a negligible 0.01% of the total money supply M1. For software-based e-money products like ecash we see in spite of booming e-commerce worldwide only a few pilot projects (e. g. Deutsche Bank).

ECB-figures for 1998 (see ECB 2000) indicate that e-money exists in the EU mainly as card-based product (electronic purse).<sup>9</sup> Card penetration is high in Belgium, Germany, Austria and Netherlands where a maximum of approx. 70% of inhabitants (Germany) owns an e-purse. But usage in these countries (except Belgium with 4 transactions per card p.a.) is negligible (less than 0,5 transactions per card).



E-purses in EU – Figures for 1998  
Source: ECB (2000)<sup>10</sup>

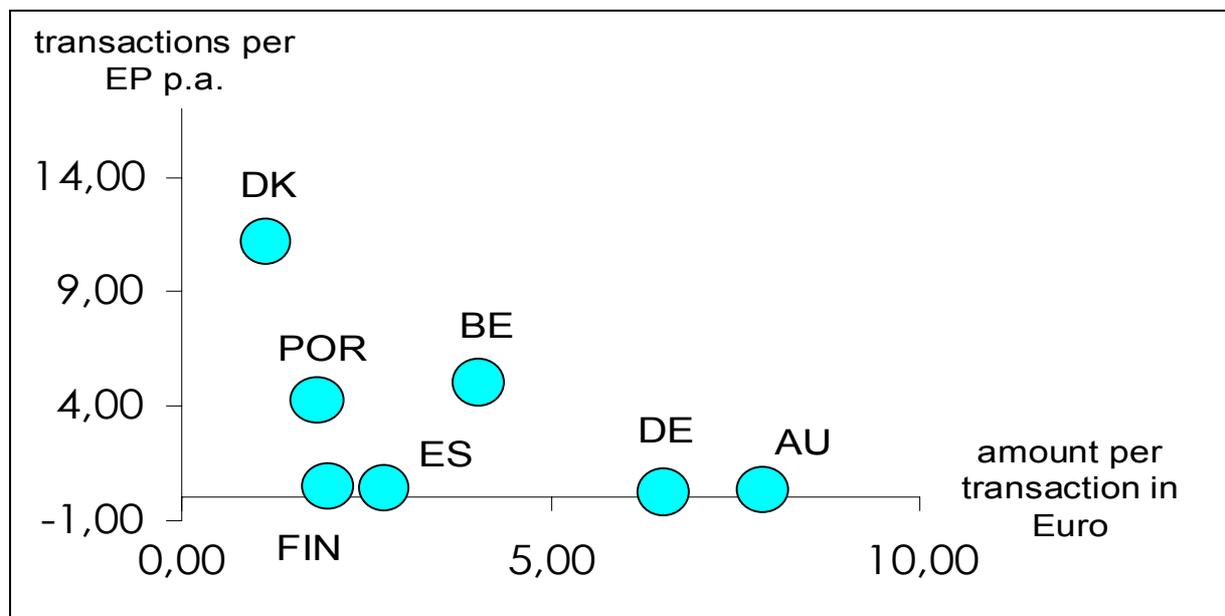
In other countries - especially Portugal and Denmark - the usage per card is relatively high (in Denmark more than 10 transactions per card), but the market penetration is relatively low. In these countries, e-purses are not distributed indiscriminately to all customers (independent of demand). Instead, cardholding is related to market demand. This shows that high rates of market penetration are a poor indicator of success if e-purses are simply distributed without taking market demand into account and without any additional costs for the cardholder. From a business case point of view e-purses are only successful if usage per card is high enough for issuers to reach

<sup>9</sup> See also BIS (1999) and Forschungszentrum Karlsruhe (1999).

<sup>10</sup> For Portuguese figures see footnote 12. The figures for the Netherlands are estimates (no figures available to ECB).

(at least) the break-even point. As the data show, high usage can only be achieved with a focussed approach that takes demand into account.

Another interesting feature of the 1998 data is that successful e-purses with relatively high usage per card (Denmark and Portugal) generate low value transactions at the point-of-sale (less than 2 Euro).<sup>11</sup> This finding suggests that e-money as card-based product will be a means of payment at the „real“ point-of-sale (POS) only for micro-payments (< 2 Euro). E-money will mainly substitute cash (especially coins) in the unmanned POS-area without personal cash handling, where cash has some natural handicaps: vending machines, public telephone, ticket vending machines in public traffic etc. If market actors make approx. 600 cash transactions (macro- and micro payments with coins and bank notes) per year and assuming that an average e-purse in a relatively “successful” market will make a maximum of 20 micro-payments, e-purses will have no potential to substitute cash in retail payments sector in relevant volume. This shows that fears of central banks to lose control over money supply caused by the reduction of outside money demand of the banks are not realistic.



E-purses in EU – Figures for 1998  
Source: ECB (2000)<sup>12</sup>

It seems to be that no market break-through, no business case and no real innovation<sup>13</sup> would be the end of e-money issued by **traditional banks**.

The only **success story** of e-money until now is the issuance of digital value by **non-banks** within closed two-party systems like prepaid GSM cards (mobile phone). They load their prepaid cards in national currency or private tokens

<sup>11</sup> The average amount per transaction in countries with a high market penetration (Germany, Austria) is much higher (>10 Euro).

<sup>12</sup> The ECB statistics for Portugal are not comparable to the figures of other countries because ECB lists for Portugal only the active e-purse-cards. In this figure the total number of e-purses is estimated at 1.2 m. cards (ECB: 411,000 cards).

<sup>13</sup> Little progress is made towards true e-money. Mondex seems to be stagnating and other schemes remain tied to accounts.

(e.g. time units), but these digital vouchers are not e-money in legal sense subject to regulation. Market researchers expected that another success story will be the issuance of electronic bonus points within multibranch loyalty schemes. Bonus points earned by one merchant, can be spent by another merchant. These bonus points are usually stored on the chipcard for shopping in the real world, but we see already the phenomenon of software-based electronic points, rewards or miles in the internet. The web's currency „beenz“ (www.beenz.com) indicates the new trend of “real virtual”<sup>14</sup> **private currencies** without convertibility into real world counterparts. It is nothing else but e-money denominated in private currency units issued by a non-bank - not only from economic point of view, but also from legal point of view. In Europe, however, the ECB tries to build a regulatory framework that would make such schemes illegal. As the next chapter shows, it would be too easy, however, to put the blame for the current lack of success of e-money only on regulation.

## **4. Business case of e-money**

### **4.1. Criteria to evaluate media of payment**

In order to be accepted by payers and payees, media of payment should possess certain properties that make them suitable for payments transactions. The traditional theory of the transactions demand for money (Baumol 1952, Tobin 1956) has focussed on transaction costs and interest. In particular interest, or rather the non-payment of interest on some forms of money has received a lot of attention in economic theory. The non-payment of interest has been interpreted as a proof that the use of money is based on government fiat (Wallace 1983, 1988). However, experience shows, that interest does not seem to be that important. Not only money issued by the government but also privately issued money such as deposits have not paid interest in the past. The fact that these types of money were (and often still are) non-interest bearing does not seem to have made a big difference. In fact, as White (1989) points out “a \$20 note held one week at 5 percent interest would yield less than 2 cents.” Clearly, when choosing means of payment other factors such as costs and convenience are more important than interest.

Transaction costs are often introduced in a fairly general way. For instance, Santomero and Seater (1996) simply assume that transaction costs are different for each good. In order to get a better understanding of the choice between different media of payment it is useful to look at the different types of costs:

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<sup>14</sup> There are plans to combine beenz with Mondex so that it could be used with a plastic card in the real world.

- effort
- time
- costs of handling various means of payment<sup>15</sup>
- explicit fees
- risk (fraud, loss, theft, system failure, privacy)

Evidently, **effort and time** are important cost factors for merchants and issuers. From an economic point of view, the interesting aspect of these cost factors is that they are mainly independent of the amount that is paid. That implies that they are particularly important for small transactions.

“**Wide usage**” does not necessarily mean that a medium of exchange has to be usable in all transactions. Still, the narrower the range of transactions is in which a medium of payment can be used the lower its prospects. Cash has the advantage that it can be used for any face-to-face transaction. So, for this range of payments cash has achieved ubiquity. Goldfinger argues that it will be hard for e-money to drive out cash, if it cannot achieve ubiquity as well.

**Fees** can be both, fixed per transaction or proportional to the amount. Given that a large fraction of costs are fixed, a fixed fee for e-money payments seems more plausible. However, fixed fees penalise small transactions – the range of transactions in which e-money competes with cash.

The **risk** of theft, loss or not receiving ultimate means of payment is a cost factor that is more related to the actual amount of the payment. In addition, for the customer it is related to the balances held and for the merchant to the balances received over the day.

Given the cost factors mentioned above, from the point of view of money users, media of payment should possess the following attributes:

- A medium of payment must be easy to use.
- It must be useable for a large number of different transactions.
- The payment process should not take too long.
- Explicit fees should be low.
- The process should be safe.
- Anonymity may be desired in some transactions - but there are also transactions in which knowledge of the counterparty is desirable.

So far, only money users have been taken into account. However, it is also important to look at the supply-side. For the issuer, different criteria are important:

- profitability
- risk

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<sup>15</sup> For instance: set up different hardware, learn different processes, deal with different suppliers, process different media of payment at the end of the day.

Evidently, profitability is important for issuers. But in connection with e-money fraud risk is also a mayor factor that has to be considered.<sup>16</sup> Theoretically, issuers could try to burden money users with fraud risk. However, there is competition between new e-money schemes and between e-money and other forms of payment. In a competitive environment, it is highly unlikely that e-money issuers will be able to burden users with the risk of fraud. Users would be particularly reluctant to carry fraud risk because they have no way of recognising e-money counterfeits. Therefore, fraud risk is likely to remain with the issuer.

It may be objected that the issuers of cash and credit cards do not necessarily carry fraud risk. In the case of cash, central banks have burdened cash users with the risk of counterfeiting. However, this arrangement can be interpreted as the typical behaviour of a monopolist. Under free banking, it was common practice for note-issuers to carry the risk of fraud (White 1984). In the case of credit cards, US regulations oblige the issuer to carry fraud risk. However, in Europe, in the case of internet or mail order & telephone (moto) orders, the merchant carries the risk. The different rules for credit cards in Europe and the U.S. seem to show, that issuers will carry fraud risk only if they are forced by the government to do so. However, an issuer who wants to gain market share may still choose to carry fraud risk. Otherwise, a new product is unlikely to take off. Thus, in IPTS (1999, 27) it is argued that the difference in liability may help to explain why there are less reservations in the US to use credit cards over the internet. If the argument is correct, taking over liability is a major factor when it comes to marketing new media of exchange. This is particularly true for such complex products as e-money.

Even if fraud risk rests **legally** with merchants or users, issuers still carry risk. In all likelihood e-money issuers will be institutions with a strong brand.<sup>17</sup> A case of fraud that involves large losses for customers would severely damage the reputation of such an issuers. While there might be no direct monetary loss, the loss of brand name capital could be even worse. Thus, even if the issuer is not liable, he may still consider to refund customers that have been damaged. Otherwise the competitive position not only as an e-money issuer but also in other markets may be weakened. McAndrew (1997, 22) provides an example that shows how seriously issuers take potential damages to their brands. When merchants faced credit card losses due to the bankruptcy of merchant banks, Visa and MasterCard stepped in and paid the merchants to protect their brand. Thus, whatever the legal rules of liability, issuers have to be concerned about risk.

At the moment, there is no medium of payment that fulfils all the criteria for both, issuers and users, in an ideal manner. In all likelihood, such an ideal medium of payment will never exist. Different types of transactions require different types of money. In addition, the preferences of money-users are just

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<sup>16</sup> Other risks are: solvency risk, liquidity risk, market risk, Herstatt risk, operational risk and systemic risk. See McAndrews (1997) and BIS (1998) and (1996b).

<sup>17</sup> Often payment services are supplied by groups of firms. For such groups McAndrews (1997) has coined the term 'branded networks'.

too diverse. For some money users costs are all important, others cherish anonymity or security and are willing to accept higher costs in return. This finding is in line with the theoretical literature. Most studies find that it is efficient to have more than one means of payment.<sup>18</sup> Thus, it can be expected that in the future, just like today, there will be multiple media of exchange, each offering a different mix of the criteria cited above.

## **4.2 A classification scheme for transactions**

When analysing the choice of media of payment it is often assumed that all transactions are the same. However, the pros and cons of a particular medium of payment may vary according to the type of transaction. Depending on the transaction, there may be a particular need for security, convenience, anonymity or low costs. Obviously, the purchase of a used car from a stranger, buying a chocolate bar or paying a phone bill may require different media of payment. In order to judge the marketability of various media of payment it is necessary to categorise transactions:<sup>19</sup>

- face-to-face, at a distance or at a machine (pay-phone)
- high value or low value
- high frequency/repeated or low frequency/spontaneous
- known or unknown counterparty<sup>20</sup>
- need of record or not
- national or international

In principle, in each case a transactor can choose between:

- cash (transferred by hand or by mail)
- deposits (transfer, standing order, direct debit, debit card, check, credit card)<sup>21</sup>
- e-money (card-based or software-based)

Thus, in order to establish e-money successfully in the market, it has to be the preferred means of payment at least in a subset of the set of transactions

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<sup>18</sup> See, for instance, Kabelac (1999), Prinz (1999), Santomero/Seater (1996), Shy/Tarkka (1998) and Whitesell (1992).

<sup>19</sup> See also IPTS (1999, 38-9).

<sup>20</sup> It is not quite clear where to draw the line. But it should not mean "personally known". Rather it has to be interpreted more broadly. A customer who deals with a retailer or another firm with a well-known brand can be said to deal with a known counterparty. Similarly, a customer who moves from A to B and has to set up a payment scheme to pay the local water supplier deals with a known counterparty.

<sup>21</sup> Even if a credit card is used, ultimate payments are made with deposits.

described above. Leaving wholesale payments aside, the most important payment categories are:

- face-to-face transactions
- transactions at a distance with a known counterparty

Commerce over the internet is expected to make another category more important: transactions at a distance with unknown counterparties

### **4.3 The pros and cons of e-money**

#### **a. Face-to-face transactions**

In face-to-face transactions e-purses compete with cash, debit cards, credit cards and checks. The main target of e-purses seem to be cash transactions. Often, cash is looked upon as a means of payment of the past (Browne and Cronin 1997, Dowd 1998, Jordan and Stevens 1997, Prinz 1999, White 1997). Even central bankers often doubt that cash will survive the current boost of innovation. According to Dowd (1998) some central banks even encourage the use of electronic substitutes.<sup>22</sup> However, the advantages and disadvantages of cash are hardly ever discussed in a systematic fashion. Rather, disadvantages of cash are compared with the advantages of e-money. Thus, in many comparisons, there is an automatic bias against cash.

#### Advantages and Disadvantages of E-money

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>- pin-protection</li> <li>- handling is cheaper</li> <li>- no problems with change</li> <li>- e-money is clean</li> <li>- e-money can be transferred via networks (i.e. the internet)</li> <li>- possibly: interest on e-money</li> <li>- possibly: contactless payment</li> <li>- possibly: reloadable via phone, internet, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- the use of e-money requires some hardware</li> <li>- e-money users cannot detect fraud</li> <li>- fraud can cause systemic risk</li> <li>- security is expensive and conflicts with anonymity</li> <li>- e-money is not suitable for hoarding</li> </ul>

In terms of fees, time and convenience, cash has still many advantages. Studies of the costs of various means of payment for German retailers show, that cash is still the least costly means of payment<sup>23</sup>. Electronic purses still

<sup>22</sup> It is interesting that central banks do not try to defend their product, cash, against the competitive threat. At best they claim neutrality '... central banks do not consider it necessary to push back cash demand beyond the already existing impact of technological developments.' (Hartmann 1998, 5)

<sup>23</sup> See Schneider (1998) and Zellekens and Rueter (1996). This finding may be somewhat surprising. However, cash payments are relatively fast – a factor that matters greatly in retail

need to prove that they are more convenient to use at manned POS. So far, merchants cannot find that e-purses speed up the payment process (Schneider 1997). There are also complaints that e-purse payments are too complicated (Schneider 1997, Van Hove 1999).

#### Advantages and Disadvantages of Cash

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>- cash requires no hardware</li> <li>- the actual payment is very simple</li> <li>- counterfeits easier to detect</li> <li>- systemic risks hardly a problem</li> <li>- finality of payment is given</li> <li>- peer-to-peer payments</li> <li>- no paper-trail, privacy</li> <li>- technical progress has enhanced the availability of cash</li> <li>- cash is suitable for hoarding</li> <li>- ubiquity</li> </ul>	<ul style="list-style-type: none"> <li>- it can be lost or stolen</li> <li>- cash handling is expensive</li> <li>- change may be a problem</li> <li>- counterfeiting</li> <li>- cash is widely used in illegal transactions</li> <li>- cash is dirty and may transmit diseases</li> <li>- cash is non-interest bearing</li> </ul>

Often it is argued that cash has a particular advantage because it serves as “legal tender” (Prinz 1999, Shy and Tarkka 1998). Thus, merchants have to accept cash in exchange. However, this argument is much less important than it seems. Whenever cash has been inconvenient as a means of payment in the past it has been driven out. In most developed countries, regular payments such as wages, rents, payments to utilities are almost entirely non-cash. In some cases such as car rentals, firms will sometimes simply refuse to service anybody who does not own a credit card. Apparently, in these cases, the legal tender function of cash is not enforced.<sup>24</sup> Even the state encourages payment of taxes or fines via debit transfer or check. Thus, factors like costs and convenience are decisive, not government fiat.

While technical progress clearly has the potential to reduce the costs of e-purse payments there are important factors that limit this downward potential. The most important factor is risk. A key problem for e-money issuers is counterfeiting (McAndrews 1997). Given the potentially large size of fraud, issuers will have to find an effective way to deal with this risk (and the other risks involved in running an e-money scheme). In order to protect themselves, e-money issuers will have use the following means against counterfeiting:<sup>25</sup>

- frequent technical updates
- limitations on the maximum amount that can be stored on cards
- limitations on the duration of e-money balances

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trade. Furthermore, backoffice costs and transfer to the bank matter less than is commonly thought – at least in countries in which armed robbery is not very common.

<sup>24</sup> According to the BIS (1999, 3, fn. 2), in some countries, merchants are not obliged to accept cash in all transactions.

<sup>25</sup> BIS (1998) and (1996b) surveys the security issue.

- no peer-to-peer payments<sup>26</sup>

These measures have potentially huge effects on costs and revenues. Frequent updates of the system in order to stay on top of the technological development substantially increase the costs of e-money schemes. The other measures reduce the way in which e-money can be used. This, in turn, will affect average balances held on cards or hard-drives. Low balances, however, imply low levels of seigniorage for issuers. Ely (1997, 103) calculates that 100 million cards with an average balance of US\$100<sup>27</sup> would yield merely US\$10 billion of total currency in circulation. This implies that the potential amount of seigniorage is also relatively small. Assuming an interest rate of 6 per cent this would yield US\$600 million or US\$6 per card. This is not enough to break even. Davis (2000) quotes estimates that a Europeanwide smartcard system based on CEPS (Common Electronic Purse Specifications) would cost between US\$ 4.8 and 6.6 billion.

Consequently, a substantial fraction of income will have to come from fees. Goldfinger cites a calculation by Edgar, Dunn and Company, that shows that a medium sized issuer with 400,000 cards and 250 transactions per card would break even in 5 years with the following fee structure: customers pay 7.5\$ per year and a load fee of 0.3\$, merchants pay a commission of 0.55%. Clearly, 250 transactions per year is a far cry from reality. Currently, issuers are happy to record 10 transactions per year per card (Van Hove 2000).<sup>28</sup>

These arguments show that it is not a forgone conclusion that the technological development will inevitably favour e-money over cash. The simple reason for this result is that technological progress is also likely to help those who try to misuse the system.

In the area of face-to-face transactions, e-money does not just compete with cash it also competes with deposits. Falling costs and higher speed of data-transmission make online payments more and more competitive in many areas. Furthermore, there are also off-line debit schemes. Already today, EFTPOS systems have captured a large market share in retailing.

## **b. Transactions at a distance**

Traditionally, for payments at a distance deposits have been used. Deposits can be transferred in a number of ways: payer initiated transfer, direct debit (payee initiated), standing order, check, credit card. For regular payments, such as rent or water bills, standing orders or direct debits are convenient and

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<sup>26</sup> Only one scheme, Mondex, allows peer-to-peer payments. However, it is argued that this makes Mondex more prone to fraud. This may be one of the reasons why Mondex has never gone beyond pilot projects and roll-outs in closed environments (like universities).

<sup>27</sup> An average balance of US\$100 is also assumed by Boeschoten and Hebbink (1996, 2). Janssen and Lange (1997, 7) assume average balances of DM 78.50.

<sup>28</sup> Therefore, it is not surprising that, in general, e-purse schemes are not making any profits (Forschungszentrum Karlsruhe 1999). Proton claims to be profitable but experts have their doubts (Davis 2000).

cheap. In addition, they provide a record. It is hard to see e-money offering competitive solutions in this market segment.

That leaves spontaneous or infrequent payments as a market segment for e-money. In particular, e-commerce via the internet is expected to increase the demand for e-money. Indeed, it has been argued that the lack of a commonly used internet-money may slow down the progress of e-commerce. However, the evidence suggests that traditional means of payment are also suitable for e-commerce (Boehle and Riehm 1998).

Advantages and Disadvantages of Deposits

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>- recurrent payments are cheap</li> <li>- no loading/unloading</li> <li>- possibly automated credit (overdraft)</li> <li>- security is scaleable</li> <li>- a record is provided</li> </ul>	<ul style="list-style-type: none"> <li>- no peer-to-peer payments (without bank clearing)</li> <li>- no anonymity/privacy</li> <li>- payment involves non-pecuniary handling costs</li> <li>- too expensive for micro payments</li> </ul>

Advantages and Disadvantages of Credit Cards

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>- easy to use</li> <li>- internationally useable</li> <li>- widely distributed</li> <li>- deferred payment</li> </ul>	<ul style="list-style-type: none"> <li>- risk for customers (limited)<sup>29</sup></li> <li>- risks for merchants/issuers</li> <li>- too expensive for micro payments</li> <li>- acceptance only by registered merchants</li> <li>- if SET is used: non-pecuniary handling costs</li> </ul>

As the table below shows, many different traditional means of payment are used by European online shops. The most widely used payment instrument on the internet is the credit card. In the U.S., the market share of credit cards is well above 90 per cent. In cross-border internet trade, credit cards are often the only possible means of payments. Although the transmission of credit card numbers via the internet is supposed to be insecure, there have been only very few incidences of fraud. Thus, it may be argued that credit have already become the accepted means of payment on the internet so that there is no demand for e-money. However, even though outright fraud is not very common, disputes over transactions occur much more often for internet transactions. As IPTS (1999, 21) points out: “although only 2% of Visa International's credit card business is in internet transactions, 50% of its disputes and frauds uncovered relate to that area.” Thus, there may be a

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<sup>29</sup> Even if customers are not liable in case of fraud, it will still costs them time and effort to report fraud and apply for a new card.

business case for a different means of payment such as e-money that is less prone to misuse. However, in order to be successful on the internet major obstacles have to be overcome. Internet users are likely require an international means of payment. That means that e-money issuers have to come to grips with the problem of international settlements in a multi-currency framework. The big advantage of credit card companies is not only that they are already in the market but that they can offer truly global means of payments.

Still, there may be market segments, such as micropayments, in which e-money has a clear advantage. Credit card transactions are too expensive for small value transactions. So far, no dominant solution for micropayments has emerged. But the presumption is that e-money might fill this gap. Many observers believe, that small payments are indeed the area in which e-money may thrive.<sup>30</sup>

#### Use of Payment Instruments by European Online Shops in 1999

	Cash	E-money	Cheque	Credit Card	Credit/Debit Transfer	Other
Domestic Orders						
Germany	42.1			22.4	33.6	1.8
Belgium	16.7			77.8	5.6	
France		5.7	20.0	74.3		
UK				100.0		
Spain	11.4			85.8		2.9
Netherlands	33.3			8.3	50.0	8.3
Sweden	40.0			20	40.0	
Italy				100.0		
Portugal	40.0			55.0		
Foreign Orders						
All Countries			2.2	92.7	4.3	0.7

Source: *Stiftung Warentest (1999)*

Two much quoted arguments in favour of e-money are anonymity and finality. It is argued that customers do not wish to make their identities known to suppliers. Suppliers, in turn, will trade with an unknown customer only if they can be sure to get paid. Thus, there is a need for a cash-like means of payment on the internet. However, it is not obvious whether this demand is very large. When trading at a distance with an unknown counterparty, risk arises because the two transactions, payment and delivery, cannot be completely synchronous (like in a face-to-face transaction). Either the buyer pays before the seller sends the purchased goods or he pays after the seller sends the purchased goods. In the first case the seller is exposed to risk and in the second the buyer.<sup>31</sup> Therefore, both parties may find it preferable to make payment via a trusted third party that shoulders part of the risk and can

<sup>30</sup> See, for instance, ECB (1998, 10).

<sup>31</sup> As one expert pointed out, anonymous e-money schemes create an asymmetry against the buyer. See Forschungszentrum (1999, 67).

negotiate in case of conflicts (Spencer 2000, 8). This leads back to a payment model that is closer to credit card payments where the card issuer supplies these functions. Therefore, the question whether the need for anonymity creates a substantial demand for internet e-money requires further investigation.

## **5. Conclusions and Outlook**

The lack of innovation due to premature regulation by excluding non-bank e-money issuance was one of the reasons for a new clear regulatory framework for e-money proposed by the European Commission in summer 1998. It introduces the special bank status of „electronic money institution“ (ELMI) for non banks. This proposal for a EU directive is a clear invitation for non-banks to come back as market players. It fosters greater competition and innovation in the e-money market. The business activities of non-banks with ELMI-status should be restricted to the issuance of e-money subjected to specific rules and prudential supervision. This EC proposal for the ELMI Directive has flared up a controversial discussion about e-money.

The definition of e-money and regulatory issues are controversial, not just between different central banks in Europe but also between the European Commission and the European Central Bank. One of the main demands of ECB is the minimum requirement for redeemability of e-money against central bank money at par. As Prof. Otmar Issing (ECB executive board member) pointed out 1999 in his speech at the Annual Hayek Memorial Lecture, that the real driver behind this requirement is the prevention of private currencies as promoted by Hayek in the seventies. It will defend one of the last remaining roles of central bank money as the sole unit of account and therefore, the legal dependence of private issued bankmoney on central bank money.

What would be the consequences of these regulative initiatives to e-money in three-party systems in Europe?

- E-money issuance would only be allowed to traditional banks and electronic money institutions.
- Multibranch loyalty schemes with electronic points stored in an electronic device issued by non-banks would be illegal.
- E-money should be denominated in central bank currency or in units with redeemability against central bank money at par.
- Regulation would prevent the emergence of real private currencies, issued by banks or non-banks with floating exchange rates to state money.
- Uprading of successful non-bank schemes from two-way to three-way schemes is made impossible.

Thus, regulation weakens the position of e-money in a fiercely competitive market. In face-to-face transactions e-money competes with access products and cash. But unlike e-money, access products such as debit and credit cards have already gained a sizeable market share. In some countries, cheques are still widely used but usage seems to be slipping. The question is

whether there is a market segment for e-money. So far, unmanned POS is the only likely candidate. That raises the question whether the high costs of developing , installing, marketing and updating an e-money system can be carried by such low-value transactions alone. A possible solution to this problem are multi-application cards. That brings non-banks into the game. Indeed, it might be more efficient to start with single purpose cards such as phone cards or loyalty cards and add a purse. Unfortunately, the ECB wants to set strict limits to the activities of non-banks.

The no-success story of e-money denominated in national currency and issued by traditional banks raises the question about the „Unique Selling Position (USP)“ of e-money. Until now the issuers of e-money copied traditional cash as medium of exchange with 100% liquidity and acceptance.<sup>32</sup> Therefore, it competes with all established payment schemes in the marketplace. Maybe, this is the wrong strategy. The unique point of e-money is its programmability. You can program the bits and bytes of e-money. You can restrict its use to the issuer, to a closed group of merchants or consumers, to certain products or services. You can limit it to geographic areas or you program a time-limit of usage. The market indicates that success of e-money will depend on using this USP of e-money.

Monetary history proves that market driven innovation will beat and bypass (premature) regulation. Market and regulation are still two uncertain parameters of the next evolution step of money. Both will decide whether the vision of Alan Greenspan of „the new private currency markets of the twenty-first century“ becomes reality.

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<sup>32</sup> One has to keep in mind though that e-money is not as close to cash as is technically feasible (Boehle 1999, 19).

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