„ELECTRONIC PURSES IN EUROLAND: WHY DO PENETRATION AND USAGE RATES DIFFER?“

by
Leo van Hove

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ELECTRONIC PURSES IN EUROLAND:

why do penetration and usage rates differ?

Leo Van Hove[*]
Assistant Professor of Economics, Vrije Universiteit Brussel
(Free University of Brussels) and Postdoctoral Fellow
of the Fund for Scientific Research Flanders

Contact Address:

ECON – 2C147
Vrije Universiteit Brussel
Pleinlaan 2, 1050 Brussels, Belgium
Tel : +32 (0)2 629.21.25
Fax : +32 (0)2 629.38.60
E-mail: Leo.Van.Hove@vub.ac.be
Homepage: http://cfec.vub.ac.be/cfec/leo.htm

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Abstract

This paper documents the recent performance of European electronic purses. It presents data on 16 such schemes, and compares their penetration and usage rates. These rates are shown to differ substantially. A number of schemes are doing increasingly well and in all probability are here to stay. These schemes have also received a boost from the introduction of the euro. But a number of other schemes are making little or no headway. Some have even experienced a relapse and appear to be on the verge of disappearance. The paper tries to identify explanations for these disparate fates.

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1. Introduction

In an article published in July 2000 (Van Hove, 2000), I presented data on the penetration and usage rates of 12 European electronic purse systems. The results clearly showed that in general e-purse projects had failed to live up to expectations. In a June 2000 lecture. Otmar Issing, Member of the Executive Board and chief economist of the European Central Bank, also concluded that "in most [euro area] countries, the use of stored value cards [was] still at a relatively experimental stage" (Issing, 2000, p. 9). However, Issing also pointed out that in view of the network effects both on the demand and the supply side, "the fact that the use of electronic money [was] not widespread up to [that] date [did] not imply that a rapid growth of this payment medium might not take place at some stage" (op. cit., p. 10). Many observers and e-purse operators were hoping that such a rapid growth would – *enfin* – be triggered by the introduction of the euro banknotes and coins on January 1, 2002. Some even argued that it might be a 'make or break' moment: "If European e-purses cannot make a definitive breakthrough now, then when?" (Van Hove, 2002).

Newspaper reports suggest that at least some of the European purses did indeed enjoy a 'euro-bounce' following the launch of the common currency. The aggregated statistics maintained by the ECB point in the same direction: they show a jump in the value of electronic money in circulation in the euro-zone from 170 million EUR in November 2001 via 208 million EUR in December 2001 – on the eve of the introduction of the euro – to 240 million EUR in January 2002[1]. The overall amount of e-money in circulation has continued to increase afterwards, but only gradually: the figure for October 2003 is 272 million EUR.

This paper tries to document the recent performance of European e-purses in a more systematic and detailed way. It presents data on 16 such schemes and concentrates on the period April 1995 – September/October 2002[2,3].

[1] Source: European Central Bank, Euro-denominated electronic money in circulation in the euro area, December 2003 <http://www.ecb.int/stats/mb/emoney/emoney.pdf>.

[2] In doing so, the paper builds on the data presented in Van Hove (2000), which were supplemented and updated based on the ECB 'Blue Book'; the BIS 'Red Book'; the latest 'Survey of Electronic Money Developments' (CPSS, 2001); annual reports, press releases, and web sites of e-purse operators; annual reports of central banks; and news reports. However, the bulk of the data was obtained directly from e-purse operators or central banks (see acknowledgements). Not all operators have been equally open but only Sistema 4B refused cooperation. As a result I have no recent data at all for the Monedero 4B scheme.

Specifically, the paper compares penetration and usage rates over time and across countries. After an introductory Section that explains the concept behind electronic purses, Sections 3 and 4 first present data on the number of cards in circulation and the number of terminals. Section 5 then analyses actual usage that is made of this infrastructure. Section 6 presents two summary measures of the state of the respective e-purse schemes; namely, the float and the number of transactions per capita. Section 7 concludes by pointing out the likely long-run winners and losers, and by offering tentative explanations for their disparate fates.

An important preliminary note is that the schemes surveyed were launched at widely diverging dates, and are thus today at different points in their life cycle. Therefore, for some of the graphs[4], two versions are presented in an attempt to make the figures more comparable: one version with a normal time axis and a second one with on the horizontal axis the number of months since roll-out[5]. Note also that the main text concentrates on general observations. Additional remarks on the evolution of individual schemes can be found in Appendix 2.

[3] Note that for some schemes I have more recent data (up to December 2003). Although not visible in the graphs with a normal time axis, these data will typically show up in the second version of the graphs (see below).

[4] The working paper version, which is available from the author, contains more of these graphs.

[5] This is not always straightforward to determine. In most cases I have taken as the date of roll-out the date at which the scheme was expanded beyond the pilot region. This does not necessarily mean that cards and terminals became available on a nation-wide scale at that point in time. Appendix 2 lists the roll-out dates of all the schemes.

2. Electronic purses: quid?

The *Glossary of Terms Used in Payments and Settlement Systems* of the Bank for International Settlements defines an electronic purse as follows: "a reloadable multipurpose prepaid card which may be used for small retail or other payments instead of coins" (CPSS, 2003, p. 22). Although in practice e-purses are also surrogates for smaller banknotes, the rationale behind their introduction – from the mid 1990s onwards (see Appendix 2) – was indeed to provide consumers and merchants with an electronic payment instrument that could handle small transactions cost effectively. Debit cards failed in this respect because in most countries they functioned in on-line mode, implying that they require a real-time connection with a central computer, which made them too costly for smaller payments. As a result, debit cards had made little or no inroads in entire sectors of the economy which were still dominated by cash – a costly payment instrument for banks.

The crucial difference between debit cards and e-purses is that the latter work off-line: they only require a 'conversation' between the card and the terminal of the merchant. The absence of telecommunication costs, the cheaper terminals, and the lower commissions compared to debit cards would – at least that was the conviction of e-purse operators and issuers – make e-purse technology an attractive alternative to cash, particularly for merchants for whom debit cards were no option.

E-purses were thus primarily positioned as a substitute for coins and banknotes. The question then is: what exactly are the advantages of e-purses over cash, both for consumers and merchants? Starting with consumers, let me first stress that compared to debit cards, e-purses have obvious disadvantages – they must be reloaded periodically, there is the risk of loss and theft, users must keep track of the balance on their cards, and they lose the float on their money – while the advantages – no PIN is required – appear minor[6]. However, as mentioned, e-purses should not be compared to debit cards, but to cash. Compared to cash, all the above disadvantages cancel out. At the same time – or so e-purse operators claim – e-purses can offer important improvements over cash. The magic word in marketing campaigns is increased convenience. Leaflets emphasise that e-purse users always have

[6] Note that this comparison omits the advantage that, given their off-line nature, e-purses can be used in places where credit and debit cards are not usually accepted.

exact change, payment is quick and easy, and there is no longer any need to walk around with a heavy and bulky wallet full of coins. Surveys point out that consumers see the added value of this, particularly in unattended applications (such as pay phones, vending machines, parking meters and transit systems) because these are the uses for which cash is truly inconvenient. Another possible improvement over cash is the ability to reload the card at home – using a PC or a smart phone – as this saves cardholders time-consuming trips to an ATM. However, this requires an additional investment on the part of the cardholder.

Turning to merchants, the advantages held out by e-purse operators are typically the following: improved security, greater earned float, fewer transaction errors, speedier transactions, and lower cash handling costs. However, a problem for the promoters of e-purses is that merchants may see few immediate benefits from e-purse acceptance. This is because the marginal cost of a cash transaction is low, given the importance of fixed costs. This implies that a merchant's total costs of handling conventional cash will not decrease linearly with the relative share of cash transactions. For example, cash handling costs are linked to a certain extent to the frequency of trips to the bank rather than to the quantity of cash being transported. In other words, it is difficult to find substantial savings in displacing *some* cash. For the merchants, then, the reality is that accepting e-purses may initially add to costs. Another remark is that many of the costs related to cash (such as counting the cash receipts at the end of the day and bringing them to the bank) are internal costs which do not (necessarily) involve a cash outlay and are therefore less visible. This may help explain the feeling amongst certain merchants that the cost savings held out by e-purses are limited compared to the required investment, particularly when a reduction of the check-out time is not judged to be of prime importance in their sector. On the other hand, there are obviously sectors where payments are particularly time-critical (public transport), where cash handling costs are particularly high (vending machines), or where vandalism is a major problem (parking meters, payphones).

3. Cards

Starting our overview of e-purse data, Figure 1 presents data on the total number of cards in circulation as a percentage of population. For most schemes this is, however, not a good indicator of their real degree of penetration. This is because in many countries – in Austria, Luxembourg, the Netherlands, to name but a few – e-purses were simply incorporated into debit cards and sent out to cardholders when their debit cards came up for renewal. As a result, in these countries the number of purses in circulation increased steadily. However, as is shown below, many of the unsolicited purses typically remained unused so that the real degree of penetration is substantially lower. As a result, Figure 1 primarily indicates how hard operators, riding on the waves of card renewal, have tried to put cards into the wallets of cardholders – and little more than that.

This said, the figure does yield a number of interesting observations. First of all it shows that in several countries the availability of cards clearly has not been the bottleneck these past couple of years. In the Netherlands, Belgium, Luxembourg, Germany[7], and Austria, penetration rates as high as 80% to 100% (and in some cases even higher) have been reached. As a result, in these countries maximum coverage has more or less been attained, and growth rates have subsequently been levelling off recently[8].

At the same time, in a number of other countries e-purses are even today only of limited (in some countries: regional) importance. This is true for Italy, France, Finland, and Spain – but the prospects differ. In Italy, the MINIpay scheme has seen virtually no expansion between 2000 and now, neither geographically nor in terms of the number of cards. In France, banks and other players were slow to reach an agreement on the technology to use and the Moneo purse has been rolled out in large numbers only fairly recently. At

[7] There is considerable uncertainty concerning the total number of GeldKarte cards in circulation. According to some sources, notably the Bundesbank, there were some 67 million cards in circulation at end-2001; other sources usually make mention of 50 to 55 million. For reasons of consistency, I have used the Bundesbank figures – which yield a penetration rate of 82%. However, if one uses the alternative figures, one arrives at a penetration rate of only 61–67%. Recent market research by InterCard underpins the alternative figures: they find that only 68% of the 85.3 ec cards in circulation in February 2003 were equipped with a chip, which corresponds to 57.9 million. InterCard notes that the banks have thus clearly not met their target to equip all ec cards with a chip by the end of 2002. For the future InterCard thinks that the chip penetration might decrease as cost awareness amongst German banks is on the increase (Source: InterCard, Chip-Ausstattung der ec-Bankkarten fällt auf unter 70%, press release, April 2, 2003).

a certain point, three separate, non-interoperable schemes were being developed[9]. The group with the most members was the Société Européenne de Monnaie Electronique (SEME). SEME's seven member banks launched a pilot of their GeldKarte-based Moneo purse in the city of Tours in October 1999. SEME primarily targeted retail point-of-sale terminals, but also wanted to gain acceptance for its cards in buses, parking meters and vending machines. The same month SEME began its Moneo test, a Mondex pilot was launched in Strasbourg by Mondex France, a company 51%-owned by Crédit Mutuel. Crédit Mutuel is France's second largest debit and credit card issuer – and, curiously, a member of SEME. Things became even more complicated when a third purse called Modeus entered the fray. Modeus was backed by four financial institutions (including La Poste, the national post office) and two transit authorities (SNCF and RATP, respectively the French railways and the Paris mass-transit system). The aim of this group was to test whether a transport ticket application and an e-purse application could co-exist on the same card. Importantly, Modeus' intention was to make its purse contactless. Fortunately, in July 2000 SEME and Modeus merged and created a new entity – aptly titled Billetique Monétique Services (BMS) – with an equal number of shareholders from both groups[10]. The new entity committed itself to pursuing the deployment of the *contact* Moneo e-purse across France as its first priority. And eventually Crédit Mutuel also settled for Moneo. Crédit Mutuel launched Moneo in Strasbourg at the beginning of the second

[8] This said, in Germany there does still appear to be room for further growth (see also the previous footnote). This is because not all German banks have been equally active in promoting the GeldKarte. The co-operative banks, represented by BVR, have for example added the e-purse to almost all their ec cards. The Sparkassen-Finanzgruppe, the group of more than 500 savings banks, has also been an active promoter (Source: "EMV migration may boost GeldKarte's case", epaynews.com, July 5, 2002 <http://www.epaynews.com>). Together, savings and co-operative banks control more than 90% of the GeldKarte cards issued and they have a disproportionate share in the volume of GeldKarte payments (Source: ePaymentsnews, Geldkarte e-purse grows in usage and sophistication, *ePaymentsnews Review*, No. 6, December 2002). The private banks, for their part, have been far less active. The Hypovereinsbank, the second largest private bank in Germany (with 8.5 million clients), has for one never offered the GeldKarte (Rallu, 2002, p. 21). The Dresdner Bank, for its part, decided to stop issuing the GeldKarte in June 2002 because of weak demand (Source: "Dresdner Bank schafft Geldkarte ab", Heise online, June 4, 2002 <http://www.heise.de>). Unlike the savings banks, the Dresdner Bank did not automatically include the e-purse function on its debit cards. And only some 55,000 customers out of 1.8 million holders of an ec card explicitly asked for it to be mounted on their cards – and paid 2.50 euro for the privilege. Finally, while the Deutsche Bank 24 (with 7.4 million clients) continues to back the GeldKarte, since the start of 2002 Deutsche Bank 24 only offers it as a separate card (Rallu, op. cit.). Recent research by InterCard mentioned in the previous footnote confirms this analysis: co-operative bank have equipped 95% of their cards with a chip, compared to 76% for the savings banks, and a meager 14% for the private banks.

[9] Card Technology, France no longer lacks an e-purse; it now has three, *Card Technology News Bulletin*, December 13, 1999.

[10] Groupement Cartes Bancaires, E-purse: Moneo and Modeus merge, dossier, 2000.

semester of 2003, so that by the end of the year Mondex cards should have disappeared completely, making Moneo the only 'universal' e-purse scheme in France (BMS, 2002a, p. 6)[11].

When interpreting Figure 1, it is important to realize that Moneo has been launched progressively, with banks acquiring local merchants as well as installing loading terminals before launching the service with consumers in a particular region or city (op. cit.). After being tested in Tours for more than a year, Moneo was first extended to Brest, Morlaix and Quimper (in November 2000). In 2001, the scheme was rolled out in additional regions and major cities (including, for example, Bordeaux, Lyon, and the whole of Brittany), so that at the end of 2001 10% of the territory was covered. In 2002, yet more regions and cities were added, leading up to the launch in the Paris market in November. In June 2002, and owing in part to the boost from the euro, BMS decided to accelerate by one year the introduction of Moneo, and to achieve national coverage by the end of 2003 instead of 2004 (op. cit.). The target for end 2002 became 60% of the territory[12]. Also important when interpreting the Figure is that (only) in October 2001 French banks began including the purse on most of their new and replacement debit cards. By June 2002 about 7 million of these combined CB-and-Moneo cards (on a total of 40 million) had been issued. The target for end 2002 was 16 million; for end 2003 it was 32 million. It is unclear whether these targets have been met.

In Finland, another country of our 'laggards' group, targets such as these have been continuously revised downward in recent years. In March 1997, the target was to have 3 million Avant-enabled bank cards in circulation by the end of 1999. This subsequently became the target for 2003, there being only some 800,000 cards in circulation as at mid-2002[13]. According to Jyri Marviala, Marketing Manager at Avant operator Automatia Rahakortit, the explanation for the delay is "the time-shift in the overall technical change-over to chip cards. One could say, that all the time the target curve has remained practically the same, depicting a mass changeover within a three-year period, but the three 'big' years have been postponed later and later. We have followed the shift in the expected time schedule of EMV change-over, as we have no stand-alone purse cards, but are 'piggy-backing'

[11] Strohl, G., Moneo arrive en Alsace, *Strasbourg Infos*, June 8, 2003 <http://www.strasmag.com/infos_stras/ moneo.htm>.

[12] Judging from a July 2003 press release (BMS, 2003) these targets will have been met.

[13] Source: Avant web site at <http://www.avant.fi/newsine.html>. This would imply that "a majority of the cards issued by banks in Finland will have the Avant electronic cash functionality by the end of 2003" (op. cit.). The target for 2005 is 5 million.

on the ATM, debit and credit cards of our owner banks. Now, the 2005 'EMV deadline' should ensure that the targets hold (more or less ...)"[14]. Turning to Spain, none of the three schemes seems to have made much progress. But then according to the SmartEuro report, only the Visa Cash scheme targets the "general audience" (2000, p. 45). The Monedero 4B purse is limited to "small closed projects", and Euro 6000 concentrates on "local projects of Saving Banks supported with value added applications on the same card" (ibidem). At the end of 2001, the combined penetration rate of the Spanish e-purse schemes amounted to 25% (down from 26% in 2000)[15].

A third – and final – general observation concerning Figure 1 is that some schemes were quicker than others to put purse-enabled cards in the market; see especially Figure 1b. This is crucial in view of the all-important network externalities and the resulting chicken-and-egg deadlock. The latter implies that merchants will be reluctant to invest in new terminals needed to accept payments unless sufficient consumers show their interest, while consumers will not use the new means of payment as long as they can only pay with it in a limited number of places (Van Hove, 1999a). In order to break this deadlock, e-purse operators need to attract a critical mass of merchants who accept the new payment cards and/or cardholders who use their cards. And providing cardholders with purse-enabled cards is obviously a prerequisite for having sufficient *active* cards. Hence, a relatively fast and massive deployment of cards appears advisable.

Figure 1b shows that especially the Luxembourg miniCASH scheme, which was launched in February-March 1999, reached a high level of card penetration extremely fast. As it happened, every Bancomat card (the local debit card) in the Grand Duchy was due for renewal at the end of 1998[16]. The Austrian, Dutch, and German banks were also quick in putting e-purses into the hands of cardholders. In Austria, for example, this was because at the end of 1995 – so 10 months prior to the full-scale roll-out of Quick in October 1996 – all 2.5 million eurocheque cards had to be renewed anyhow, and it was therefore decided to directly equip them with a chip[17]. Judged by this

[14] Source: Marviala, J., personal e-mail, August 20, 2002. The March 2002 Annual Report of the Finnish Bankers' Association confirms that the "introduction of the smart cards did not proceed in line with the schedules banks had prepared in 2002" (p. 29).

[15] Source: own calculations based on data taken from the ECB 'Blue Book'.

[16] Source: James, C., miniCASH: pioneering role for Luxembourg's electronic purse, *Business*, No. 117, February 1999 <http://www.cetrel.lu/infos/DetailPresse.html$131>.

[17] Source: Judt, E., Quick – die elektronische Geldbörse in Österreich, *cards Karten cartes*, Heft 4, November 1996, p. 34-37.

yardstick, the backers of Proton in Belgium did a poor job. However, just like Moneo in France, the Proton card was introduced across Belgium in phases – city by city – and it took Banksys more than two years to cover the whole of the country. In the absence of a 'big bang', what matters is not so much the overall penetration rate but rather the penetration rate in the regions that have already been covered – which is something that cannot be inferred from Figure 1b.

As was already pointed out, in countries where issuers flooded the market with unsolicited cards, many remained unused. The number of active cards is therefore a more reliable indicator of card penetration. A problem here is that e-purse operators use widely diverging definitions – with some of them using more than one. The concepts that are used range from 'cards loaded at least once since issuance' (Avant, CASH in Sweden, Euro 6000, miniCASH, MINIpay, Proton in the early years, Quick), via 'cards with a non-zero balance' (Cash in Switzerland, MEP, Moneo), 'cards loaded at least once in the previous 12 months' (Monedero 4B), all the way to 'cards used at least once in the previous 6 months' (Proton, Euro 6000), 'cards used at least once in the previous 3 months' (Moneo), and 'cards used at least once in the current month' (GeldKarte, MEP)[18]. Since the first three definitions concentrate on whether the cards are or have been charged (rather than used for payments), I have grouped such statistics in Figure 2, under the term *activated* cards. Statistics that comply with the latter three definitions are presented in Figure 3, under *active* cards.

Starting with Figure 2, a first observation is that I have far less data compared to Figure 1 – for the simple reason that e-purse operators are considerably less open when it comes to releasing data on the number of activated (or active) cards, rather than just the total number of cards issued. Part of the explanation for this may lie in the fact that the data are simply less flattering: the degree of penetration invariably lies significantly lower when gauged in terms of the number of activated cards. A salient example is the Swedish CASH card – for which the penetration rate drops from about 50% to a mere 6%. But similar remarks can be made for just about any scheme. Tellingly, in a survey commissioned by the Austrian central bank and conducted in the fourth quarter of 2001 (Mooslechner et al., 2002, p. 96 and 98), only 22% of respondents stated that they possessed a card with a Quick e-purse

[18] In the case of the GeldKarte, 'used' means that the card has either been loaded or used for payment at least once during the month in question; the Proton figures only take into account purchase transactions.

application, whereas the actual figure was probably more than three times as high (see Figure 1a)[19]. There thus appears to be a problem of awareness – which is obviously by no means proper to Austria[20].

In fact, only Proton and miniCASH can boast satisfactory penetration rates – with Proton towering way above the other schemes[21]. The only observation that I have for the Netherlands relates to the combined penetration rate of Chipknip and Chipper[22]. When concentrating on the evolution over time, a positive note is that the penetration rate of most schemes has been increasing consistently – with three exceptions. First, the Italian MINIpay scheme has been virtually stagnating – at a very low level. Second – and this is quite alarming – the number of activated CASH cards has been dropping since December 2000. The third and worst case is the Multibanco purse in Portugal, where the number of cards with a positive balance has been dropping since the beginning of 1999. In December 1998 there were still 411,000 activated MEP cards; by December 2001 this had dropped to 119,000. And in July 2002 that figure dropped to a mere 4,000 cards, because cards that were still functioning in PTE were removed from the statistics[23]. The scheme has thus *de facto* all but disappeared. A final interesting observation is that the penetration rate of the Swiss Cash purse is higher than that of the Austrian Quick purse, even though the overall penetration rate of the former is lower. Part of the explanation is that the Swiss Post Office – which has a market share of 37% in the debit card market – decided not to include the Cash purse on its debit card, but to issue a separate card for which customers have to apply (and pay!)[24]. On the one hand, this result in a lower

[19] Moreover, Mooslechner et al. point out that while the total number of Quick cards in circulation has increased constantly, revealed Quick ownership has remained fairly constant over time – the figure for Q1 1997 being 15%, for example. From this they conclude that "the survey results signal that people were becoming less informed relative to the number of cards issued" (Mooslechner et al., 2002, p. 98).

[20] Even in Luxembourg, where the miniCASH purse is doing relatively well, this was the case. In a survey conducted in early 2001, 48% of respondents stated that they possessed an e-purse (Colson and Havé, 2002, p. 11), whereas the actual penetration rate at that time was roughly 70%. And in a survey conducted in the Netherlands in January 2003, almost one third of respondents said that they did not have a Chipknip (Source: Interpay, Chippen, een kwestie van bewustzijn, *Betaalwijzer*, Nr. 2, July 2003, p. 7).

[21] Some caution is required concerning the two most recent observations for Proton since these were not obtained directly from Banksys. The sources are SmartEuro (2000) and ECR (2000b, p. 8), respectively. I have been unable to get these figures confirmed by Banksys.

[22] Cf. "At the end of 2001, more than 22 million prepaid cards were circulating, 6 million of which were loaded, ..." (De Nederlandsche Bank, *Quarterly Bulletin*, March 2002, p. 25). The definition used is 'cards loaded at least once' (Source: Kieviet, R., personal e-mail, April 9, 2002).

[23] Source: Hipólito, P., personal e-mail, December 20, 2002.

[24] See the notes to Figure 1 in Appendix 2 for more information.

number of cards in the hands of the public but on the other hand there are relatively less sleeping cards: the 'activation rate' of the Postcard Cash purses is significantly higher than that of the bank-issued purses (respectively 35% and 8% in October 2002). Still, the Postcard Cash purses only account for some 6% of the total number of activated cards. The second part of the explanation is that the activation rate of the bank-issued purses is also slightly higher in Switzerland than in Austria.

Turning to Figure 3, which depicts the ratio of active cards to total population, there is an obvious difference in level between Proton on the one hand and GeldKarte and MEP on the other hand – although one should take into account that Banksys' definition of 'active' is less strict (cf. supra). Interpay does not release any data on active cards but according to a (reliable) industry source about 10% of the Chipknip cards in circulation were active at end – January 2003 (same definition as GeldKarte and MEP). This would imply that some 10% of the Dutch population were active Chipknip users at that point in time. According to Pierre Fersztand, CEO of BMS, 78% of activated cards were in active use in spring 2002 (that is, were used at least once in the previous 3 months)[25]. This would boil down to a penetration rate of almost 12% in April 2002.

Where the evolution in the number of active Proton cards is concerned, it is particularly interesting to see that there was a jump of some 700,000 cards between December 2001 and January 2002 – clearly on account of the euro. To repeat, the definition used here is 'cards used for at least one purchase transaction in the last 6 months'. The number of active Proton cards continued to increase until June 2002 (when an all time high of 28% of the population was reached), and gradually dropped afterwards. However, the level at end-March 2003 (23%) is still higher than the level at end-2001 (18%). I have no post-euro data for the GeldKarte, but in a November 2002 article Andreas Koebe, sales manager for S-Card Service, the payment card services and marketing unit of Sparkassen-Finanzgruppe, is quoted saying that still "only about 2% or 3% of GeldKarte cardholders are active purse users" (Card Technology, 2002, p. 9). Given that the value that I have for December 2001 is 1% to 1.5%[26], this seems to indicate that there might also have been a euro

[25] Source: Fédération Bancaire Française, "Trois questions à Pierre Fersztand", *Actualité Bancaire*, Nr. 466, May 22, 2002.

[26] Depending on the figure used for the total number of GeldKarte cards in circulation; see footnote 6.

effect in Germany, albeit a smaller one[27]. Finally, where Austria is concerned, the regular payment card survey conducted by the Oesterreichische Nationalbank provides some indication of active Quick users. As mentioned, only 22% of respondents stated that they owned a card with a Quick e-purse application. Of these, 54% never use the purse function, 9% say they use it "several times a week", 11% "about once a week", 12% "at least once a month", and another 12% use it "less than once a month" (Mooslechner et al., 2002, p. 98, Table 1). If one adds up the first three user categories (and thus uses the same definition as for GeldKarte and MEP), active users total 32% of self-declared owners – which is equivalent to some 7% of the respondents.

[27] Another recent article states that "only 5% of cards are actually in use" (Source: ePaymentsnews, Geldkarte e-purse grows in usage and sophistication, *ePaymentsnews Review*, No. 6, December 2002).

4. Terminals

Figure 4 presents data on that other part of the infrastructure of an electronic purse scheme: terminals. A first interesting observation is that there are three schemes that almost consistently outperform Proton – the scheme that proved to be the most successful overall in Van Hove (2000) and that I therefore use as a benchmark throughout this paper. For one, the increase in the number of miniCASH terminals has been quite spectacular, especially if one takes into account that the miniCASH purse was launched almost three years later than Proton. The number of Chipknip terminals has also increased faster compared to Proton – except, that is, in recent periods. However, a significant portion of the Chipknip acceptance points are so-called 'combi terminals' – terminals that accept both debit cards and e-purses[28]. As will be shown below, merchants who already accept debit cards are not really part of the core market of an e-purse, and such acceptance points do not generate high transaction volumes. Finally, it comes as a surprise that the Portuguese MEP scheme is among the high-flyers in terms of terminals. As was documented in the previous Section, cardholders have been deserting the scheme since early 1999 and recently it has imploded completely. In such a setting, one would not expect to see new merchants joining the scheme[29]. The explanation is that the recent increase in the number of MEP terminals is basically a mirage caused by the fact that all new POS terminals being deployed are combi terminals[30].

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[28] In early 2001 some three quarters of the Chipknip terminals were combi terminals (De Nederlandsche Bank, *Quarterly Bulletin*, March 2001, p. 25). In a 2002 memorandum Jaap Akkermans states that "almost 100% of the Dutch POS-terminal base accepts Chipknip" (Akkermans, J. memorandum, December 2, 2002). Part of the explanation for this is the agreement made in 1999 that POS terminal owners would not have to pay monthly subscription fees (de Vries and Nielen, 2001, p. 13). Judging from a presentation by Antoon Kuijpers of Interpay, in March 2003 only some 15% of the Chipknip terminals were Chipknip-only terminals (Source, Kuijpers, A., Ontwikkelingen in het betalingsverkeer, presentatie, Expert meetings betalingsverkeer, Hoofddorp, April 1, 2003).

[29] I have not succeeded in obtaining an explanation for the jump in the number of terminals between March and April 2000.

[30] Source: Hipólito, P., personal e-mail, December 20, 2002. I have no recent figures concerning the relative importance of purse-only terminals. However, by the end of 1998 there were only "about 16 thousand off-line PMB terminals" out of a total of more than 53,000 (Source: SIBS web site, consulted on March 7, 2000), which corresponds to 30%. Experience shows that combi terminals do not generate high transaction volumes. According to the SIBS annual report for 2000, U-POS accounted for about 70% of MEP transactions and portable terminals for more than 25%. The remainder – a mere 5% – took place at debit card POS terminals that also accepted MEP. According to the report, an important explanation for these figures are 'MEP-only environments' in companies (Source: SIBS, *Relatório e Contas 2000* <http://www.sibs.pt/).

A second interesting observation is the jump in the number of miniCASH and Proton terminals between December 2001 and January 2002. Apparently, fear for a 'cash crash' in the first weeks after the euro launch prompted additional retailers to start accepting e-purses. This may also have been the case in Austria, but since I have no data for January 2002 it is difficult to tell. Interestingly, a number of other schemes have experienced a *negative* euro impact. In Spain, for example, since the introduction of the euro Visa Cash is no longer accepted in Teléfonica's roughly 90,000 public telephones (Carnero, 2002a). According to Carmen Carnero, general deputy manager Visa España/SERMEPA, "Teléfonica was experiencing a massive decrease in the revenues obtained from their public telephones due to the phenomenal take off of mobile phones". It was therefore "agreed that there was no business case for any of the parties [in adapting] the domestic electronic purse to the euro". Infrastructure upgrades will be made directly for CEPS technology[31]. For much the same reason, most Avant-accepting pay phones did not survive the introduction of the euro either, resulting in a slight drop in the total number of terminals. According to Jyri Marviala, "the downscaling trend in payphone networks has been continuing for several years since the 'mobile revolution', but only became so abrupt due to the cost that the euro change-over would have imposed"[32].

Other schemes that have not been doing particularly well – but for reasons unrelated to the euro – are the Swedish CASH scheme and Danmønt in Denmark. The number of CASH terminals at the end of 2002 was lower than at the end of 1999. Danmønt, for its part, suffered a blow when TeleDanmark (now TDC) stopped accepting Danmønt in its payphones network as of January 1, 2001 (ECR, 2000a). However, according to Pernille Kylling of PBS, "mobile phones had minimized this market" anyhow[33]. Back in 2000, there were fears that the Copenhagen metro system might follow TeleDanmark's example (ECR, 2000b), but according to Kylling the Danmønt card is still accepted at ticket vending machines in train stations. Figure 4 also shows that while it is increasing, the number of GeldKarte terminals is still clearly too low. To end this Section on a positive note, let me mention that until May 2003 – the final month for which I have data for Moneo – Moneo's speed of deployment was almost identical to that of Proton at a comparable point in time.

[31] Source: Carnero, C., personal e-mail, September 12, 2002.

[32] Source: Marviala, J., personal e-mail, August 20, 2002.

[33] Source: Kylling, P., personal e-mail, August 22, 2002.

5. Usage

Now that I have described the e-purse infrastructure that is in place in the respective countries, let me proceed with an analysis of actual usage that is made of this infrastructure. Figure 5 shows that if one uses the number of transactions per *issued* card as a yardstick, the overall level is extremely low. Only Proton has succeeded in breaching the barrier of 1 transaction per card *per month* – and this only recently[34]. However, after the discussion in Section 3 it should be clear that the low overall frequencies of use reflect the importance of sleeping cards more than anything else. It is therefore better to look at the frequencies of use per activated card as is done in Figure 6. Still, Figure 5 does show 'euro-bounces' in the usage rates of the Proton, miniCASH, and Chipknip cards (respectively from 0.8 to 1.2, from 0.4 to 0.7, and from 0.15 to 0.25 transactions per card per month). The Quick card in Austria also enjoyed a euro-bounce but this is less clear in the graph because I have no observation for January 2002. It is, however, visible in Figure 8a.

Note also that the usage rate of the Swiss Cash card – which obviously could not benefit from the introduction of the euro – is relatively high: it is comparable to that of the Chipknip card, and higher than that of the Quick purse. Part of the explanation lies in the lower proportion of sleeping cards (see Section 3). Given the dramatic fall in the number of activated (and active) MEP purses documented in Section 3, the slide in its overall frequency of use should come as no surprise. A similar remark can be made for the Swedish CASH card. In view of the low number of terminals the low usage rate of the GeldKarte is also hardly surprising. The Italian and Spanish schemes are doing even worse. On the other hand, the usage rate of the Moneo card – the latest addition to the pack – appears to hold promises for the future.

Figure 6 gives frequencies of use per *activated* card – which are by definition higher than those in Figure 5. When looking at the post-euro usage rates, it is striking that there are two distinct clusters: one with purses that are doing relatively well, and a second comprising the rest. miniCASH, Cash in

[34] Note that the Proton figures for May-November 1996 are still strongly influenced by the cards that had been in use for more than a year in the pilot cities of Louvain and Wavre. In April 1996, the final month of the pilot, the frequency of use amounted to 2.1. The abrupt drop in the frequency of use in December 1996 is caused by a typical end-of-year jump in the number of debit cards that come up for renewal.

Switzerland, Quick, and Moneo are all in the first cluster, with usage rates ranging from 3.0 to 4.3. Usage rates in the second cluster are close to 1 (MEP) or significantly below 1 (Euro 6000, CASH). Note that the high variability of the Moneo figures is caused by the gradual geographical expansion of the scheme: tapping new regions initially lowers the overall result[35]. The drop in the Moneo usage rate in the first months of 2002 is therefore not alarming per se. However, more recent data indicate that this drop has continued well into 2003. It thus remains an open question whether Moneo will be able to regain its position in the first cluster.

Because Banksys discontinued its data series on activated cards (and now concentrates on the number of 'active' cards; see below), I have no recent observations for Proton. However, there is little doubt that Proton would figure amongst the first group[36]. Where the Netherlands is concerned, if one uses the estimate – reported in Section 3 (see footnote 21) – of the number of activated cards in the Chipper and Chipknip schemes together, and if one assumes that the 'activation rate' of the two schemes is identical[37], one arrives at a figure of 0.57 – which places Chipknip in the second cluster. However, this is an estimate for December 2001 – before the introduction of the euro and the accompanying surge in Chipknip usage. If the activation rate is kept constant, usage rates for September-October 2002 amount to 1.6–1.8.

If one were to take into account differences in launch dates between the schemes, it would become even more evident that miniCASH has the best result overall, followed by the Swiss Cash scheme[38]. The initial results obtained by the relatively young Moneo scheme are also interesting. With 3.9 transactions per activated card six months after the start of the nation-wide launch, Moneo outperforms all other schemes at that point in their lifecycle[39].

[35] This is also true for Proton; see Van Hove (2000) for more details.

[36] It could be argued that the most recent observation for Proton – relating to April 2000 – points in the other direction. However, as is explained in footnote 20, the two most recent figures on the number of activated Proton cards are suspiciously high. And if the number of activated cards is overstated, the frequency of use per activated card will obviously be understated.

[37] This boils down to dividing the total number of activated cards over the two schemes in proportion to the total number of issued cards.

[38] Concerning the Cash scheme, it has to be stressed that the definition of activated card used – 'cards with a non-zero balance' – is somewhat more strict than the definition used by other schemes (with the exception of MEP). Other things equal, this has the effect of increasing the frequency of use per activated card.

[39] Here too, some caution is required. I have taken as the time of 'national launch' of the Moneo scheme October 2001, when French banks began including the Moneo purse on their debit cards. However, at that time the scheme was already operational in Tours (the pilot city, since October 1999), in Brest, Morlaix, and Quimper (since November 2000), Montpellier and Poitiers (April 2001), Bordeaux (May 2001), and Lyon (June 2001).

As already indicated, recent results have been less promising. However, in May 2003 Moneo's performance was still comparable to that of Proton. Finally, Figure 6 again shows that the Swiss CASH scheme and MEP in Portugal have suffered a severe relapse.

As mentioned in Section 3, for some schemes I have data on the number of *active* cards, so that the frequency of use per active card can be calculated. Especially the results for the Proton card are of interest here. However, when interpreting these results, one has to keep in mind that the figures are moving averages over 6 months[40]. The Proton figure of 3.30 for December 2001, for example, tells us that a Proton card that was used for at least one purchase transaction between July and December 2001, was used on average 19.7 times over the same period, or 3.30 times per month. Interestingly, active Proton cards are being used more and more frequently: the value for March 2003 is 3.95.

[40] Since active Proton cards are defined as 'cards that have performed at least one purchase operation in the past 6 months, I computed the frequency of use not by dividing the number of transactions in any particular month by the number of active cards in that month, but rather by dividing the number of transactions in the previous 6 months first by the number of active cards, and subsequently by 6 – the latter in order to convert it into a monthly figure.

6. Summary statistics

The two final Figures in the paper offer comparative data on the average amount outstanding on e-purses on a per capita basis, and on the number of transactions per month and per capita. These indicators can be interpreted as 'summary measures' of the state of the respective schemes. Indeed, because the indicators are expressed per capita they are influenced by the degree of penetration; that is, the number of users relative to total population. At the same time they are also positively correlated with actual use: the higher the frequency of use per card, the more money users will, ceteris paribus, tend to load onto their cards. Note, however, that even though both indicators can thus be seen as summary statistics, *a priori* the schemes might to some extent rank differently on the two indicators. A scheme that is successful in the retail environment should, *ceteris paribus*, score higher on the float indicator than a scheme that has targeted, say, parking meters. The reason is straightforward: on average, the value of a retail e-purse payment will tend to be higher. Conversely, given the frequency of payments for parking the opposite might be true for the second indicator.

Figure 7 shows that Proton is the most advanced scheme in terms of float per capita, but taking into account the number of months elapsed since roll-out adjusts this picture: the Luxembourg miniCASH scheme actually has a consistently better result than Proton. It is also interesting to point out that the bulk of Proton's euro-jump actually took place in December 2001 – before the advent of the euro. In the final weeks of the pre-euro era, Proton load operations were reportedly running at three times the usual level[41]. As can be seen in the Figure, in February 2002 the total amount outstanding on Proton cards started to decrease somewhat, but the level prevailing in March 2003 (not visible in the Figure) was still substantially higher than before the introduction of the euro. miniCASH usage was also positively influenced by the introduction of the euro. Two other schemes which also have experienced a euro-jump in their float figures are Chipknip in the Netherlands and Quick in Austria[42]. In the case of Quick, a small relapse can again be noted after the spike coinciding with the euro change-over. miniCASH and Chipknip on the other hand did not experience such a relapse.

[41] Source: "Belg ging massaal op zoek naar euro's", *De Morgen*, January 2, 2002.

[42] The series in Figure 7 relates to the combined float for the Chipknip and Chipper schemes. However, as is explained in the notes to Figure 1 in Appendix 2, the Chipper scheme has been phased out so that recent observations relate to the Chipknip scheme alone.

Compared to the schemes just mentioned, the Avant, Danmønt, and GeldKarte schemes are stagnating, but in all three cases the total float is (very) gradually creeping upwards (which is not really visible in the Figure due to the differences in scale). Where Danmønt is concerned, it should be noted that there was a drop in the float between end-1996 and end-1997, and it was only at the end of 2001 that the 1996 level was again reached. At end-2002, the float was a mere 17% higher as compared to December 1996. However, CASH in Sweden and MEP in Portugal are doing even worse. Figure 7 shows that the Multibanco electronic purse has never really taken off. In fact, ever since end-1997 the amount outstanding on MEP cards has fallen almost consistently. In July 2002 it reached levels below one euro cent per capita. The Swedish CASH scheme is not faring much better: the float has been falling since early 2000. This was obviously a bad sign and it is thus not really surprising that the Swedish banks have recently announced that they will discontinue the scheme in Fall 2004[43]. Finally, it will be noted that according to the ECB Blue Book, the total amount outstanding on *all* Spanish e-purses as at December 2001 was 21.63 million EUR (up from 16.77 million EUR in December 2000). This works out to some 0.55 euro per capita, which would place Spain in between Danmønt and Cash (SE) at that point in time.

Figure 8 presents data on the number of transactions per month and per capita, and by and large confirms our earlier conclusions. First, Proton and miniCASH are leading the pack, with Chipknip a good third – and improving. As will be shown below, the latter is due to no small extent to the creation of 'cashless environments'. Second, there are clear-cut euro-jumps for Proton, miniCASH, Chipknip, Quick, and (albeit on a much lower scale) also for Moneo; see Figure 8a-bis. Importantly, the euro-impact has not been limited to the first months following the launch of the common currency but seems to be a lasting one. In four out of the five cases – Chipknip, miniCASH, Moneo, and Quick – transaction volumes for October 2002 were actually higher than those for January. This is especially true for the Netherlands, where transactions picked up steam in the spring, and have continued to rise ever since. In Belgium, things are less clear-cut but the transaction volume, which jumped by 60% in January 2002, was still 43% higher in October 2002 compared to December 2001. Incidentally, the drop in the number of Proton transactions in July and August 2002 is due to seasonal fluctuations. Similar fluctuations can also be detected for miniCASH, Chipknip, Quick, and Moneo.

[43] Nordea, Cashkort upphör 2004, press release, January 12, 2004 <http://www.nordea.se/bin/pressm/h_press.pl?id=N/ 1151/PR/200401/930308.xml>.

Finally, to put things into perspective, it can be noted that even in Belgium e-purses have so far not displaced cash to a substantial extent. According to an estimate by the Belgian Bankers' Association (BVB, 1999, p. 5), the number of cash transactions conducted in Belgium amount to some 4 billion per year, or 333 million per month. In March 2002, its record month so far, the Proton scheme registered 11.9 million transactions – which is equivalent to 3.57% of the estimated number of cash transactions. As was anticipated in Van Hove (2000), Proton has thus been unable to reach its target of displacing 5% of cash transactions within 5 years – that is, by May 2001. And this target was conservative compared to those of other schemes (op. cit.). According to De Nederlandsche Bank, the number of cash transactions conducted in the Netherlands amounted to 6.9 billion in 2001 and 6.8 billion in 2002[44]. Based on this, the two Dutch EP schemes together would have displaced some 0.4% of cash transactions in 2001, and 1.3% in 2002. If one concentrates on Chipknip's record month in 2002 – that is, November – the figure becomes 1.6%. According to a December 2002 survey commissioned by Interpay amongst a panel of 4,000 Dutch households, the Chipknip card would have accounted for 2.1% of the *total* number of transactions, compared to 67.1% for cash[45]. However, the article points out that the number of cash transactions – and thus also the total number of transactions – is probably underestimated. In France, the number of cash transactions is estimated at 25 billion per year[46]. Judged by this benchmark, Moneo does not even appear on the radar screen: its relative importance is below 0.01%.

[44] Sources: De Nederlandsche Bank, Annual Report 2001 and Quarterly Bulletin, March 2003.

[45] Source: Interpay, Wensen, behoeften en betaalgedrag in beeld, *Betaalwijzer*, Nr. 4, December 2002, p. 2.

[46] Source: "Porte-monnaie: un projet déjà ancien", in Analyses & Synthèses, *Portemonnaie électronique*, Les Enquêtes d'Analyses & Synthèses, Nr. 1, 2002, p. 7.

7. Main findings

A first general conclusion from the preceding analysis is that the introduction of the euro coins and banknotes has had a positive impact on e-purse usage in several euro-zone countries (Austria, Belgium, France, Luxembourg, and the Netherlands)[47], but – interestingly – not in all of them. For example, there has been (virtually) no euro-inspired e-purse renaissance in either Germany or in Italy. Some schemes have even experienced a negative euro impact in the sense that specific terminals did not survive the change-over. This is true for Avant in Finland and Visa Cash in Spain (see Section 4). The exact reasons behind the disparate euro impact will be the subject of a separate paper. However, my working hypothesis for now is that some schemes simply lacked critical mass. For, say, a German consumer who wanted to avoid having to use the unfamiliar euro coins and banknotes in the early days of 2002, starting to use the local GeldKarte purse was no real option as the number of merchants accepting it was too low. This might explain why the bigger euro jumps are seen in established e-purse markets.

Another observation that catches the eye when comparing countries is that Scandinavia does not appear to be very fertile ground for e-purses. As indicated above, the CASH scheme in Sweden will disappear in Fall 2004, Danmønt in Denmark is stagnating, and Avant in Finland is not making much progress either. To this, one might add that in Iceland – "the country in the world that comes closest to being a card payment system" according to De Grauwe et al. (1999, p. 1) – the announced KLINK card has failed to materialise. Finally, Norway to date also lacks a general-purpose electronic purse. One reason for the lack of success of e-purses in Nordic countries appears to be that debit cards can be used for lower-value payments compared to other countries. This is at least the case in Finland. Jyrkönen and Paunonen (2003, p. 11–12) of the Bank of Finland point out that "the use of e-money is at a very low level in Finland. One reason for this is that Finnish consumers

[47] An important caveat here is that jumps in e-purse usage coinciding with the introduction of the euro cannot always be fully attributed to this factor alone. A salient example is the Netherlands. As will be explained below, the introduction of the euro coincided with the introduction of Chipknip-only parking in three cities. Payment for parking in these cities alone currently accounts for some 15% of the total number of Chipknip transactions, and was thus an important factor behind the jump in Chipknip usage. Another example is Luxemburg, where EFTPOS operator CETREL, as part of a promotional campaign, halved merchant commissions on debit card and e-purse payments during January and February 2002 (Source: CETREL, *Rapport de Gestion 2001,* p. 11).

are accustomed to paying with other payment cards, especially with debit cards, that can also be used for small payments". In this respect it is interesting to note that, unlike in Belgium for example, Finnish debit cards are mainly off-line (op. cit., p. 13). For Sweden and Denmark, similar explanations were given to me by Dimitrios Ioannidis of the Sveriges Riksbank and by Henrik Arnt Andersen of Danmarks Nationalbank – even though in both countries debit cards function in on-line mode[48]. Ioannidis confirmed that in Sweden debit cards can be used for small-value payments although some shops impose a minimum of SEK 100 (some EUR 10 at current rates)[49]. He also mentioned the structure of the Swedish retail sector, with relatively few family-owned shops and many big retail chains – which are reportedly more inclined to accept debit cards. An Internet survey on electronic money conducted by Mattias Ekholm (a student at Kunglinga Tekniska Högskolan in Stockholm) in cooperation with Aftonbladet.se, a major Swedish newspaper, provides some additional evidence[50]. On the question 'Would you rather see that the credit/debit card were easier to use on small values?', a resounding 84% of respondents answered affirmatively[51], thus revealing a clear preference for debit cards even for small amounts. For Denmark, Andersen stressed that debit cards are free of charge for consumers and merchants alike[52]. As a result, "debit cards are used for virtually all transactions", even transactions of 1 or 2 euro[53]. Finally, concerning Iceland the *European Card Review* notes that the Icelandic banks have abandoned the KLINK purse precisely because debit card use has "been successfully extended to low value payments in merchants such as newspapers and fast food outlets. Because the fraud risk is negligible, cardholders are able to pay for low value items such as newspapers without signature or PIN verification. 'Transactions only take a few seconds, making cards more convenient than cash,' says [Richard] Cullen [who has responsibility for Iceland in Visa EU].

[48] Source: Ioannidis, D., telephone conversation, October 25, 2002; Anderson, H. A., personal e-mail, May 22, 2003.

[49] Note that even this limit is low compared to common practice elsewhere in Europe. Dutch banks, for example, advise consumers to use cash or e-purse for amounts below EUR 15, and debit cards for amounts above EUR 15 (Source: Interpay, Wensen, behoeften en betaalgedrag in beeld, *Betaalwijzer*, Nr. 4, December 2002, p. 3).

[50] Cf. Utter, H., Framtidens plænbok är elektronisk, *Aftonbladet*, October 12, 2001, <http://aftonbladet.se/vss/ekonomi/story/0,2789,96027,00.html>.

[51] Ekholm, M., personal e-mail, August 5, 2002. 1,028 answers were received, 31 of which were discarded for various reasons.

[52] Cf. Rolfe (2003, p. 19): "Under Danish law, Dankort is tightly-regulated as well. In terms of section 14 of the 'Act on certain payment instruments' (PCA), banks are prevented from charging fees to merchants for Dankort acceptance". To be clear: banks are allowed to charge cardholders but they do not (probably for competitive reasons).

[53] Source: Anderson, H. A., personal e-mail, May 22, 2003.

"With this extension of debit cards, the Icelandic banks have abandoned the 'Klink' electronic purse launched in the mid-1990s" (ECR, 2002).

Continuing our geographical overview, it is striking that e-purses are not very popular in Southern Europe either. As indicated in previous Sections, the Portuguese Multibanco purse has *de facto* disappeared, none of the Spanish schemes is gaining much ground, and neither is MINIpay in Italy. In Greece no electronic purse has even been launched. I have no firm explanation for this observation. One might argue that in several of these countries debit cards are typically less popular compared to countries where e-purses are relatively successful. Up to a certain point the popularity of debit cards might indeed be an indicator of the readiness of a population to embrace electronic payment instruments in general[54]. E-purse operators also tend to piggyback on the existing debit card infrastructure (see Section 3). The Blue Book statistics for 2000 confirm that the number of debit card payments per capita is significantly lower in Greece (0.1 per year), Italy (5.5), and Spain (7.2) than in Belgium (39.8). However, the explanation does not hold for Portugal as the number of debit card payments per capita (45.3) exceeds the level prevailing in Belgium. Still, the Portuguese MEP cards are mainly stand-alone cards[55]. An interesting development in Italy – where, to repeat, MINIpay is not making much headway – is that prepaid magnetic-stripe cards are starting to catch on. These cards allow teenagers and others without bank accounts to make purchases using the same point-of-sale and transaction processing networks as debit and credit cardholders[56].

Recapitulating, our geographical overview has so far shown that e-purses are not very successful in either Scandinavia or in Mediterranean Europe. That leaves countries that lie at the heart of Europe, and – interestingly – particularly smaller countries. Luxembourg is the most salient example but Austria, Belgium, the Netherlands, and Switzerland are also small compared to, say, Germany. As explained in Section 3, in view of the network externalities involved it is crucial to have sufficient penetration both in terms of merchants and (active) cardholders. Moreover, it is advisable to reach this critical mass as soon as possible after launch. One could argue that this is

[54] I have added the qualification 'up to a certain point' because the Nordic experience described earlier seems to indicate that the relationship is not necessarily a linear one. Note that in Denmark (77.1) and Finland (49.3) the number of debit card payments per capita is higher than in Belgium. The figure for Sweden is 28.9.

[55] Cf. "*Some* debit and/or credit cards include the PMB card facility" (CPSS, 2001, p. 66; my emphasis).

[56] Source: "Prepaid payment cards start to catch on in Italy", *Card Technology News Bulletin,* February 18, 2003.

easier when the country is smaller. For one, a small geographical scale makes it possible to focus promotional efforts. In addition, chances are that the number of actors – both issuers of cards and organisations on the acceptance side – is lower, thus reducing coordination problems. For example, it may be sufficient to convince one or two operators and/or authorities in order to attain adequate coverage in the parking business. The environment might also be more homogeneous in terms of the technology used in, say, vending machines.

In this respect it is interesting to note that Belgian and French operators have launched their purses on a city-by-city basis right from the start (see Section 3). Perhaps even more interesting is the fact that Europay Switzerland reconsidered its strategy in year 5. Rather than continue to target the whole of the territory, in 2001 the 'Zenterstrategie' was introduced, as is evident from the Annual Report for that year: "A new concept is geographic focusing: efforts will now be concentrated on so-called 'A centers' – or cities, which have converted public transportation to CASH"[57]. In the same year, the marketing campaign of ZKA in Germany also started targeting cities. Recently München was chosen as the 'GeldKarte-Vorreiterstadt 2003' (GeldKarte pioneer city 2003)[58]. According to Jan Hendrikx, Euro Kartensysteme CEO, such actions are successful; "we've found that with a push, usage jumps 40%–60% and stays there" (ECR, 2003a, p. 5). In München, GeldKarte transactions even jumped by 116% in the first half of 2003[59].

Another conclusion is that in a market where network externalities are important, incompatibility may well prove detrimental (Van Hove, 1999b). It creates uncertainty among consumers and merchants, and cuts up the

[57] Source: Telekurs, *Annual Report 2001*, p. 18. Cf. also the following two quotes: "Von der flächendeckenden Erstürmung der Schweiz ist die Europay inzwischen weggekommen: Zu teuer. Jetzt konzentriert man sich auf bestimmte Agglomerationen. "Wir lernen aus den Fehlern", kommentiert [CEO] Bischoff (Baschek, E., "Das Kind lernt endlich laufen", *HandelsZeitung*, January 30, 2002, p. 6 <http://www.handelszeitung.ch/archiv/>). "Europay fördert CASH vor allem in großen Städten: Die entsprechenden Promotionen in Genf, Lausanne, Neuenburg, Lugano, Luzern und Bern zeigen Wirkung" (Europay Switzerland, "Wachtumspotential bleibt unvermindert hoch", *Europay News*, Nr. 1, April 2002, p. 3).

[58] Source: S-Card, München ist neue GeldKarte-Vorreiterstadt, news release, March 28, 2003 <http://www.scard.de/news/>. Interestingly, BitWallet in Japan seems to be following a similar strategy in promoting its Edy purse: "In addition to going after large retail chains, BitWallet is also looking to court independent retailers in single locations *to create something like Edy hot spots* where a large number of retailers accept the card" (Source: "Japan's contactless cash goes nationwide", Itworld.com, July 19, 2002).

[59] Source: EURO Kartensysteme, Akzeptanz der GeldKarte in München steigt deutlich – Vorreiterstadt-Kampagne erfolgreich, press release, September 4, 2003.

market – thus making it even harder to attain critical mass. Suffice it to mention the battle between Chipknip and Chipper in the Netherlands, and the fragmented e-purse market in Spain (see the notes in Appendix 2 for more details about both cases). In France and Switzerland, it initially also looked like several schemes were going to compete head-to-head, but luckily in these countries all players agreed upon a common solution before any of the schemes was launched on a national scale. Interestingly, in Finland the first version of the Avant e-purse was launched by a subsidiary of the central bank. By taking an active part in the development of the new payment instrument, the Bank of Finland precisely wished "to avoid the unnecessary emergence of several parallel or overlapping card systems in Finland" (Kokkola and Pauli, 1994, p. 13).

However, agreeing on a common standard is one thing, for an e-purse to become successful all participating issuers and acquirers must be completely committed. This is not evident as it implies cooperation between competitors. Belgium and Luxembourg are two countries where this seems to have happened without problems. In a recent article, Frans Baeyens, general manager, domestic payments and deposits at KBC Bank in Belgium is quoted saying: "2002 was the first year the banks made a profit on this activity. It required an enormous effort, but *all the parties involved* kept the faith in the business case for years on end" (ECR, 2003a, my emphasis). I have also not come across any evidence of major rifts between banks in Austria and France (although in the latter case the national launch of Moneo may have been delayed by the search for a common solution). In Germany, on the other hand, the GeldKarte is a priority for the co-operative and savings banks, but far less so for the private banks (see footnote 7). Importantly, a recent survey by InterCard shows that while on a national scale chip penetration (as a percentage of the number of ec cards issued) averages 68%, in some regions this figure is below 26% – depending on which (type of) banks have a high market share in those regions. This is particularly true for former Eastern Germany[60]. In Switzerland, the Post Office – which accounts for roughly one third of the debit card market – joined the Cash system with some delay, and then only half-heartedly. As is explained in Section 3, the Cash purse is not included on the Postcard debit card, but is issued by Postfinance as a separate card for which customers have to apply and pay[61]. This gives the impression that Postcard Cash is currently not considered a strategically important

[60] Source: InterCard, Chip-Ausstattung der ec-Bankkarten fällt auf unter 70%, press release, April 2, 2003.

[61] See the notes to Figure 1 in Appendix 2 for further details.

product[62]. According to Fabio Casali, Head of Product Marketing – Pay Before at Telekurs Europay AG, Telekurs is in talks with Die Post to put the CASH function on their debit cards but, if at all, this will only happen in 2–3 years[63]. In Sweden, Svenska Handelsbanken entered the CASH consortium three years later than its peers, i.e. in 2000 (see notes to Figure 1 in Appendix 2). But oddly enough Handelsbanken has yet to issue its first card[64]. In practice the CASH purse is thus promoted not by 80% of the Swedish bank card market as the CPSS (2001, p. 76) claims, but by 70% – roughly the same level as in Switzerland. Moreover, S-E Banken only puts the CASH chip onto its debit cards if the customer asks for it[65]. Where Danmark is concerned, Rolfe (2003, p. 20) notes that while "Danmønt expanded strongly in its early years, it began to suffer from lack of follow-through, especially in marketing". Reportedly, marketing of the Danmønt product was reduced constantly after PBS acquired TeleDanmark's interest in 1997 and began operating Danmønt as a wholly-owned subsidiary. As a result, relations with vendors and service providers deteriorated (ECR, 2000a). For Portugal, the *European Card Review* noted in mid-2000 that "further development of the PMB purse [was] low priority for the banking community" (ECR, 2000b, p.8)[66]. Finally, in Finland, when it comes to promoting Avant "different banks have been leading and lagging ... at different times", according to Jyri Marviala of Automatia[67].

In the preceding Sections I have repeatedly stressed the importance of network externalities. According to the network externalities theory, what matters is the size of the network. For cardholders this means the number of terminals, for merchants it is the number of (active) cardholders. This theory does indeed help explain many of the inter-country differences in the uptake of e-purses. For example, it helps explain why miniCASH in Luxembourg, with a higher number of terminals and cardholders at comparable points in time (see Figures 1b and 4), outperforms Proton in Belgium – and all other

[62] A newspaper report confirms this: "Die Post hält das Produkt für 'nicht strategisch' und beschränkt sich auf 70.000 Karten, die speziell auf Anfrage abgegeben werden. 'Bei Postfinance hält sich die Nachfrage nach dem Produkt konstant auf eher niedrigen Niveau', erklärt Mediensprecher Alex Josty" (Baschek, E., "Das Kind lernt endlich laufen", *HandelsZeitung*, January 30, 2002, p. 6 <http://www.handelszeitung.ch/archiv/>).

[63] Source: Casali, F., personal e-mail, March 20, 2003.

[64] Source: Geuken, Fr., personal e-mail, April 9, 2003.

[65] Source: Geuken, Fr., personal e-mail, April 17, 2003.

[66] This was confirmed to me by Pedro Hipólito of SIBS: "None of the Portuguese financial institutions is promoting PMB due to the poor business model" (Hipólito, P., personal e-mail, December 20, 2002).

[67] Source: Marviala, J., personal e-mail, August 20, 2002.

schemes for that matter (see Figures 7 and 8b). It also underpins why the German GeldKarte card, with a low level of terminals (see Figure 4), performs less well than Proton[68]. On the other hand, in this theoretical framework the initially limited success of the Chipknip card in the Netherlands is – at least at first sight – rather puzzling. As appears from Figures 1b and 4, both the number of cards and terminals was significantly higher than for Proton; yet the Chipknip scheme made little progress (see Figures 7 and 8b). However, as was pointed out in Section 4, a large proportion of the Chipknip terminals were in fact converted debit card terminals, which are typically of limited use for e-purse users[69]. As pointed out in Van Hove (2000), this was even more of a problem for the Austrian Quick scheme: at the end of 1998, no less than 92% of all terminals were "Bankomat-Kasse POS" terminals. By the end of 2001, this proportion had not changed[70]. However, recently things seem to be changing for the better somewhat: in May 2003, the combined share of vending machines and attended Quick-only terminals in the retail sector stood at 10% (compared to 9.8% in December 2002)[71]. The relative importance of converted Bankomat-Kasse terminals thus decreases gradually. Interestingly, while such terminals represented 92% of the Quick network at the end of 2001, they only accounted for some 30% of all Quick payments in the fourth quarter of 2001 (Mooslechner et al., 2002, p. 102, Chart 6).

A final lesson is therefore that besides the quantity of terminals, their 'quality' matters too. More concretely, an electronic purse needs the support of at least one and possibly more sectors with a large number of small cash payments: public telephones, parking meters, vending machines and/or public transport. To start with payphones, it is clear that their importance has been diminishing due to the phenomenal uptake of mobile phones. However, in Belgium the deal with Belgacom early in the lifecycle of Proton was a vital one for Banksys. Public payphones proved to be a very popular application (Van Hove, 2000) and – perhaps even more important – it was an ideal way to get

[68] When looking at Figure 1b, one could point out that in the first three years of the GeldKarte and Proton schemes, the former had the highest penetration rate in terms of the number of cards in circulation. However, what matters is the number of *active* cards because this is what merchants observe. And the number of active GeldKarte cards was/is clearly very low (see Figure 3).

[69] Indirect evidence reveals that the relative importance of combi terminals has dropped. According to a case study on the Proton World site (at <http://www.protonworld.com/casestudies/dompurse_nl_factors.htm>), U-POS terminals represented 20.4% of the Chipknip network at the end of 2002 compared to an estimated 16% at the end of 1999 (Van Hove, 2000).

[70] Source: Europay Austria, *Business Report 2001*, p. 30.

[71] Source: own calculations based on Europay Austria information.

people to use Proton for the first time. According to Jan Hendrikx, Euro Kartensysteme CEO, the main lesson from the German experience is precisely to get more cardholders to take the first step and use GeldKarte: "Once they use it, they stay with the product" (ECR, 2003a, p. 5)[72].

Parking is another application which can generate high transaction volumes, especially in so-called cashless environments. The Netherlands is the case in point here. As is explained in more detail in the notes to Figure 1 (in Appendix 2), several local authorities in the Netherlands seized upon the introduction of the euro to introduce payment by Chipknip for their parking facilities. In Purmerend, Nijmegen and Rotterdam, this even became the *only* way to pay for parking in the streets. As a result, the number of Chipknip payments for parking jumped by more than 600% in 2000, to 25 million transactions. No less than half of these transactions took place in the three cities mentioned[73]. Overall, in February 2003 parking accounted for 31% of the total number of Chipknip payments, even though at the end of 2002 the sector accounted for only 5.7% of all Chipknip terminals[74]. However, the impact is even bigger than this since there is a clear spill-over effect from parking to other payment segments: in Purmerend, the number of Chipknip payments in the retail sector increased by 127% in the first half of 2002, whereas the national average was only 28%[75]. Interestingly, BMS in France is also pushing purse-only parking. At parking meters in the Paris suburb of Boulogne-Billancourt, the Moneo card is already *de rigueur* – the only acceptable method of payment[76]. BMS is also in talks with the City of Paris in order to replace the Paris Carte – which is currently used at the 12,500 parking meters in Paris – by Moneo (BMS, 2002b, p. 4)[77].

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[72] Cf. also the following statement by Andreas Koebe, then sales manager for S-Card Service, the payment card services and marketing unit of Sparkassen-Finanzgruppe: "We did some market research, and we saw that once [consumers] used GeldKarte in vending machines, for tickets, they saw it as an advantage. And, once they have learned to use the GeldKarte, they will stick to it" (Card Technology, 2002, p. 8).

[73] Source: De Nederlandsche Bank, Current developments in payments and securities transactions, *Quarterly Bulletin*, March 2003, p. 20.

[74] Sources: Interpay website and case study on the Proton World site (at <http://www.protonworld.com/casestudies/ dompurse_nl_factors.htm>).

[75] Source: Interpay, Cashless parkeren stimuleert Chipknip-gebruik elders, *Betaalwijzer*, December 2002, p. 7. Importantly, the difference cannot be explained by developments on the acceptance side. In 2002, the number of non-parking terminals increased by 14.6% in Purmerend, compared to 9.8% nationally (Source: Vergoossen, A., personal e-mail, February 10, 2003).

[76] "Moneo fonctionne sur tous les horodateurs de Boulogne-Billancourt", in Analyses & Synthèses, *Portemonnaie électronique*, Les Enquêtes d'Analyses & Synthèses, Nr. 1, 2002, p. 14.

[77] See also "La Ville de Paris veut généraliser la carte", *Le Monde*, January 19, 2003.

Parking is also one of the segments targeted by Telekurs Europay in Switzerland. For some years now, Telekurs Europay is following a niche marketing strategy. A recent Proton World case study states: "In 2002 it was decided based on a review of past performance that CASH should be marketed as a niche product"[78]. The identified niche markets are: "public mobility ...; parking; branded channels: retail chains such as coffee shops, fast-food and kiosks; closed user groups (...); e-government"[79]. However, the focussed marketing strategy is older than this. A press release accompanying Europay Switzerland's annual report for 2000 stated: "The primary emphasis for acquiring was placed on vending machines and in the public transportation sector"[80]. As a result, the network of Cash acceptance points at the end of 2002 comprised 10,000 vending machines, 2,000 ticket machines in buses and local transportation, and 2,000 car park ticket machines[81]. On a total of some 33,500 acceptance points, this implies a share of no less than 42% for so-called U-POS terminals, up from 20% at end-1999, and 12% at end-1998 (Van Hove, 2000). I am not aware of any other scheme which puts more emphasis on U-POS – not even miniCASH in Luxembourg[82].

Usage figures for Chipknip in the Netherlands and for Quick in Austria confirm that vending machines and U-POS in general are popular applications. In the Netherlands, vending machines represented 5.3% of the terminal park at end-2002, but with 18.4% their share in the total number of Chipknip transactions over the year 2002 was significantly larger. In Austria, U-POS (comprising parking meters, public transport ticket machines, laundry machines, etc.) was good for 62% of all Quick payments in the fourth quarter of 2001 (Mooslechner et al., 2002, p. 102, Chart 6)[83], even though U-POS terminals represented only 5.9% of the terminal park in June 2002 – and probably even less over 2001[84].

[78] Proton World, CASH in Switzerland, case study, March 2003.

[79] Ibidem.

[80] Europay Switzerland, Successful reorganization, press release, April 2001.

[81] Proton World, CASH in Switzerland, case study, March 2003.

[82] For miniCASH, I have no specific data on the share of U-POS terminals. However, at the end of 2002 miniCASH-only terminals – which is a *broader* category – accounted for some 35% of all terminals, compared to 38% at end-2001 (own calculations based on CETREL, *Rapport Annuel 2002*, April 29, 2003). This said, a November 2000 press release notes that the majority of miniCASH payments were made in the payphones and parking sectors, and in the U-POS sector (Source: CETREL, miniCASH – maxi confort ou 1 millions de paiements miniCASH, press release, November 15, 2000).

[83] Up from 50% in October 2000 (Source: "Euro-Einführung sollte Schub für elektronische Geldbörse bringen", *Der Standard*, December 6, 2002).

[84] Source: Europay Austria press releases.

Given this, it is not surprising that ZKA in Germany has high hopes about GeldKarte-enabled cigarette vending machines. In an attempt to curb underage smoking, the German Ministry of Health has decided that by January 1st, 2007 all of the country's more than 600,000 cigarette vending machines will have to be able to determine whether the consumer is at least 16, the legal smoking age in Germany[85]. Following agreements between on the one hand savings and co-operative banks (represented by DSGV and BVR respectively) and on the other hand the federation of German tobacco wholesalers and cigarette vending machines suppliers, newly issued debit cards will contain a legal-age code and by 2007 all machines will accept the GeldKarte as payment[86]. In Fall 2002, 50,000 of these machines had already been equipped. By end-2003 this figure had increased to 80,000[87]. Even though smokers will still be able to pay with cash once the age-check is done, a German consulting firm predicted that "if consumers were required to insert their GeldKarte in order to patronize cigarette vending machines, the machines alone would play host to 600 million GeldKarte transactions in 2007"[88]. That is almost 17 times the total of all GeldKarte transactions in 2002. Similar projects are in the pipeline in the Netherlands and apparently also in Switzerland[89].

As the Octopus scheme in Hong Kong has shown[90], another potential volume-booster and door opener might be public transport. However, all in all, European e-purse operators have been slow in bringing electronic

[85] Card Technology, Hey buddy, you got a GeldKarte?, *Card Technology News Bulletin*, October 17, 2002. Note that some sources talk about 800,000 cigarette machines (Cf. Card Technology, Can the Internet and cigarettes save GeldKarte?, *Card Technology News Bulletin*, March 21, 2002; ePaymentsnews, Geldkarte e-purse grows in usage and sophistication, *ePaymentsnews Review*, No. 6, December 2002).

[86] S-Card, DSGV-Pressemeldung zur GeldKarte-Jahresstatistik 2002, press release, January 31, 2003 <http://www.scard.de/>. The association of the public banks is still in negotiations. The private banks, having issued a negligible number of purses (see footnote 7), have yet to make a move.

[87] Koppe, V. and K. Bregulla, GeldKarte: deutliche Steigerung der GeldKarte-Akzeptanz, workshop, OMNICARD, Berlin, January 15, 2004, p. 8 <http://www.geldkarte.de/ww/de/pub/aktuelles/omnicard_2004.htm>.

[88] Card Technology, Hey buddy, you got a GeldKarte?, *Card Technology News Bulletin*, October 17, 2002.

[89] Sources: Interpay, Sigaretten trekken met Chipknip, news release, March 1, 2003; Proton World, CASH in Switzerland, case study, March 2003.

[90] A caveat here is that a distinction has to be made between the number of trips registered and the number of actual e-purse payments made (for single fares). Also, Octopus is only slowly making inroads in the retail environment. At end-2002, non-transport transactions accounted for 5% of the turnover (Source: ECR, Hong Kong: Octopus spreads its tentacles, *European Card Review*, Vol. 10, No. 1, January/February 2003, p. 5). More recent estimates put the share of retail at 10% (Balaban, 2003).

ticketing into their schemes. Part of the explanation for this is that all European schemes are contact-based, whereas the preferred option for transport applications is obviously a contactless card – as in Hong Kong. As a result, if a European e-purse can be used in the transport sector at all, tickets are typically not loaded onto the card. Rather the card can be used to buy paper tickets at vending machines (and in some cases at terminals on buses). With few exceptions[91], projects also tend to concentrate on regions or cities[92].

Prospects for increased usage of e-purses in the transport environment differ significantly across schemes. In Belgium, where so far not much emphasis has been placed on the use of Proton for transport applications, the portable payment and ticketing terminals carried by the staff on every train will be able to accept Proton by 2004[93]. In 2001, Banksys announced that by 2004 all Belgian debit cards would be so-called combi cards capable of handling contactless transactions so that by 2005 paper tickets for all transport modes in Brussels would be completely eliminated[94]. However, according to industry sources this timetable no longer stands. In Finland, "one of Europe's biggest multi-transport smart card based fare collection systems" was launched in Helsinki, the capital city, in Fall of 2002[95]. The system has been designed to handle an estimated 1.2 million travel transactions a day. The main goal was to replace all seasonal and serial (paper and cardboard) tickets by a smart card. While that smart card is *not* the Avant card but a separate transport card (called Travel Card), all terminals and vending machines in metro and train stations have been equipped to accept Avant payments *for single fares*[96]. In France, the transport future of the local Moneo purse looks particularly bright, which should not come as a surprise given that both Paris' main transit operator RATP and the French railways SNCF are shareholders of BMS (see Section 3). Since October 2001, RATP has progressively been issuing a contactless card, named Navigo Pass[97]. In late 2002, more than 500,000

[91] One such exception is the Avant card in Finland: "At the railway stations, Avant coverage has already extended nationwide as all self-service terminals for train tickets are accepting Avant payments" (*Automatia News*, August 2002 <http://www.avant.fi/newsine.html>). CECA in Spain manages transport ticket applications in 16 cities with about 6 million transactions per month. However, these are performed by means of a special application that is separate from the Euro 6000 e-purse (Source: de Andrés Turrión, A., personal e-mail, June 20, 2003).

[92] Cf. Munich in the case of the GeldKarte.

[93] Source: "Vanaf 2004 betaalcomputers op treinen", *De Morgen*, November 2, 2002.

[94] Source: "MIVB schakelt over op Proton", *De Morgen*, May 22, 2001.

[95] Source: "Helsinki implements ticketing system", *Cards Worldwide news*, September 24, 2002.

[96] See <http://www.ytv.fi/matkakortti/english/faq.html> for more details about the Travel Card.

[97] Source: Treguier, Chr, "Moneo, Navigo, Calypso: cartes à puce en quête de respectabilité", *ZDNet France*, November 12, 2002 <http://news.zdnet.fr/story/0,,t118-s2125770,00.html>.

cards had already been issued and 800 subway stations had been equipped to accept them. By mid-2003, RATP plans to have issued 1 million cards – the ultimate goal being 5 million[98]. Initially, RATP is only issuing Navigo cards to riders who buy annual or monthly passes. However, the Navigo has been conceived from the start as a multi-application card, capable of hosting, for example, an electronic purse – in this case the Moneo purse[99]. According to BMS (2002a), in the course of 2003 the first subway stations should have been equipped to accept Moneo. Moreover, SNCF has decided to accept Moneo in all its vending machines and ticket windows[100]. In the Netherlands, on the other hand, Interpay seems to have missed the public transport boat. Together with ERG, the Australian company (and former owner of Proton World), Interpay participated in a tender for the Dutch National Public Transport system, but lost. The tender comprised the development of a contactless transport card, to be introduced nationwide in 2004. A consortium with Vialis, Accenture, Thales and the Hong Kong public transport company MTR Corporation won the bid.

Finally there is the Internet, where electronic purses could potentially be used for micro-payments. Opinions differ as to whether this can become an important application. According to Carmen Carnero, of Visa España/SERMEPA, "the key opportunities for the electronic purse in Spain are digital TV, Internet micro-payments, mobile commerce" (Carnero, 2002a). In Belgium, Banksys showed themselves quite early to be aware of the Proton card's potential as a secure means of payment for the Internet: Banksys made the first version of its C-ZAM/PC terminal available to the general public as early as December 1997. However, Proton met with limited success on-line, and in 2002 Internet payments with Proton were discontinued without drum or trumpet[101]. In Germany, consumers have been able to use their GeldKarte for buying on the Web since January 2001, but reportedly few consumers have readers and relatively few sites accept the card[102]. As argued in Van Hove (1999b), part of the explanation for these failures undoubtedly

[98] Sources: Davis (2003) and Davis, D., 2003: chip cards break new ground, *Card Technology*, December 2002 <http://www.cardtechnology.com/cgi-bin/readstory.pl?story=20021216CTMS631.xml>.

[99] Interestingly, according to the latest edition of the Red Book, of the Paris mass transportation users, "only 50% are bank cardholders" (CPSS, 2003b, p. 121).

[100] Preparations are expected to take 12 to 18 months (BMS, 2002a).

[101] Loading the Proton card over the Internet is still possible.

[102] Sources: Card Technology, Can the Internet and cigarettes save GeldKarte?, *Card Technology News Bulletin*, March 21, 2002; "Vielfalt an Bezahlsystemen bremst E-Commerce", *Heise Online*, March 7, 2002.

lies in the persisting lack of interoperability between the different national e-purse schemes. As a result, only local Internet merchants will accept the card so that the number of on-line acceptance points will be too low to warrant the purchase of a card reader. And the longer it takes for the Common Electronic Purse Specifications to become a reality, the smaller the window of opportunity for e-purses.

8. Concluding remarks

In the preceding Section, I have offered a number of partial explanations for the observed differences in penetration and usage rates of e-purses in Europe. Table 1 (see following page) tries to summarize the lessons learned. To that end, the first 4 columns of the Table present a number of general characteristics of the countries under consideration and their payment systems, whereas the final 4 columns concentrate on the characteristics of their respective e-purse schemes. In the Table, an attempt has been made to rank the countries according to the degree of success of the local e-purse(s). To be more precise, the indicator used in ranking the countries has been the number of transactions per capita and per month, and this 36 months – or 3 years – after national launch. In short, the philosophy behind the Table is similar to the one used in Figure 8b[103]. The figures in brackets behind the names of the countries refer to their ranking after 5 years. miniCASH and Moneo have no such ranking because they have been launched only relatively recently.

In the Table, entries in bold indicate 'positive' characteristics, whereas shaded entries point towards 'negative' characteristics. For example, the shaded entries in the first column indicate that e-purse operators in Germany, France, Italy and Spain have had – ceteris paribus – a harder time trying to turn their new payment product into a success simply because of the size of their country. That is, *unless* they opted for a phased introduction (as in France) or for a strategy of geographic focussing (as in Germany after some time); see column 6. In some columns, I have not shaded or put in bold anything at all. This is because a priori the direction of the correlation is not clear-cut. For example, one could interpret a high level of currency usage as a sign that there is a large potential market for e-purses (that has not yet been invaded by debit cards as in Finland; see Section 7)[104]. However, at the same time it could also

[103] As explained in Section 6, the number of transactions per capita can be considered to be a summary statistic. The reason why I did not use float figures – the other summary statistic – is of a pragmatic nature: I completely lack float figures for Switzerland. The choice for 36 months was in part also pragmatic: extending the time period would have led to the exclusion of miniCASH and Moneo, the two schemes that are relative newcomers. Even in the present Table, Moneo is somewhat disadvantaged because my time series ends in month 25 after launch.

[104] Note that C/GDP is not a good indicator of currency usage for everyday transactions because C is also affected by the extent of hoarding and by the size of the underground economy. However, there are no reliable comparative data on cash transactions.

Table 1

Country	Population 2002 (000s)	Currency in circulation 2000 (% GDP)	Debit card payments, 2000 (per capita, per year)	Type of debit card system	Number of e-purse schemes (launched)	Phased introduction	Support from issuers	U-POS
1. Luxembourg (–)	441	1.9	26.2	on-line	1	No	Full	Purse-only terminals 38% end 2002
2. Belgium (1)	10,254	4.8	39.8	on-line	1	Yes, from start	Full	Payphones early in lifecycle
3. Switzerland (2)	7,209	7.9	23.9	on-line	1	Geographic focusing in year 5	No priority for Post Office	Niche strategy in 2002
4. The Netherlands (3)	15,920	4.2	50.4	on-line	initially 2 non-interoperable	No	Initially Post-bank backed Chipper	purse-only parking
5. Portugal (6)	10,004	4.7	45.3	on-line	1	No	?	
6. Denmark (4)	5,338	2.9	77.1	on-line, but low-value	1	No	?	
7. France (-)	60,431	3.1	54.5[a]	off-line with chip	1	Yes, from start	Full	
8. Sweden (9)	8,871	4,2	28.9	on-line, but low-value	1	No	Handelsbanken initially not involved	
9. Austria (5)	8,810	5.9	9.1	on-line	1	No Geographic	Full Low priority	
10. Germany (7)	82,168	6.2	12.7	on-line	1	focusing in year 6	for private banks	
11. Finland (8)	5,176	2.2	49.3	off-line	1	No	Unclear	
12. Spain (10)	39,927	8.9	7.2	on-line	3, of which 2 now interoperable	No	?	
13. Italy (11)	57,728	6.0	5.5	on-line	1	Not available on national scale	?	

Sources: ECB, *Blue Book Addendum incorporating 2001 figures*, September 2003; BIS, *Red Book statistical update*, November 2003; Adams (2003, p. 26) for column 4 – complemented with direct information from local operators or experts. [a] Includes delayed debit and credit cards.

be seen as an indicator of strong resistance against electronic means of payment in general. Concerning column 3 it can be noted that, as is explained in Section 7, the relationship between the popularity of debit cards and the readiness of a population to embrace e-purses is not necessarily a linear one.

The information presented in the Table is obviously very rough and does not permit to draw definitive conclusions. However, it is no coincidence that the bold entries can be found primarily in the top half of the Table, and that the opposite is true for the shaded entries. Simplifying somewhat, the ultimate profile of a successful e-purse scheme seems to be: a scheme active in a relatively small country (and/or one that has opted for a phased introduction), where debit cards are fairly popular but function in on-line mode (and/or cannot be used for low-value payments[105]), where all players quickly agreed upon a common solution so that there were no incompatibility problems, where all (major) banks participate in the scheme *and* prove to be completely committed, and – finally – where the e-purse project receives support from players in at least one and possibly several of the following sectors: public telephones, parking meters, vending machines, and public transport.

In conclusion it can be stated that the introduction of the euro seems to have separated the corn from the chaff in the European electronic purse market. A number of schemes – miniCASH in Luxembourg, Proton in Belgium, Chipknip in the Netherlands, Cash in Switzerland, and Quick in Austria – are doing increasingly well and in all probability are here to stay for quite some time. With the obvious exception of the Swiss purse, these schemes have also received what appears to be a lasting boost from the introduction of the euro. On the other hand, the jury is still out on several schemes which have either been launched recently (Moneo) or are making little or no headway (GeldKarte in Germany[106], Avant in Finland, Danmønt in Denmark, MINIpay

[105] As the Finnish case illustrates (see Section 7), the presence of an off-line debit card can reduce the market for an e-purse. In this respect, it is interesting to note that the latest EMV releases from Visa and MasterCard, VSDC and MChip4, contain the ability to pre-authorize off-line debit payments. MasterCard calls this pre-authorized debit, Visa calls it VSDC+ or Visa Low Value Payments. The ECR (2003b) stresses that "both associations seem to be positioning pre-authorized debit as a low value payments tool which could provide a viable alternative to electronic purse cards".

[106] In its annual report for 2002, the Deutsche Bundesbank notes that "in Germany, the use of e-money is stagnating at a relatively low level and it is not possible to tell at present whether a much wider use can be expected" (Deutsche Bundesbank, *Annual Report 2002*, May 2003, p. 132).

in Italy, all three Spanish schemes). Some schemes have even experienced a relapse and are on their way out (CASH in Sweden[107], and particularly MEP in Portugal). In short, both the current state and the future of e-purses in Europe look mixed.

[107] In a recent article, Nyberg and Guibourg (2003, p. 32) of the Sveriges Riksbank still had some hope: "Thus far, the Cash Card has not won much acceptance in Sweden (this also applies to other markets for that matter) and, recently, growth has even been negative in terms of the number of transactions.... However, the development of card-based e-money is still at an embryonic stage. Therefore, there is reason for caution when it comes to making forecasts of its future evolution".

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Appendix 1 – Figures

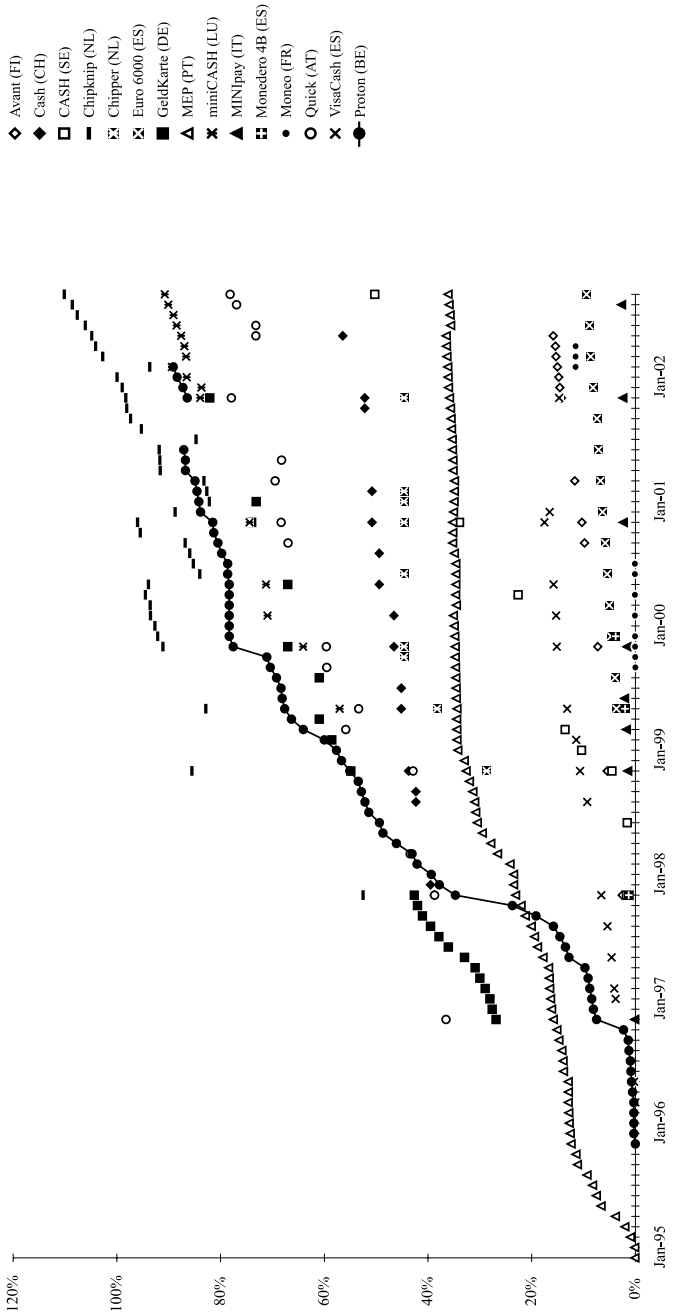


Figure 1a – Total number of cards in circulation (% population)

Figure 1b – Total number of cards in circulation (% population)

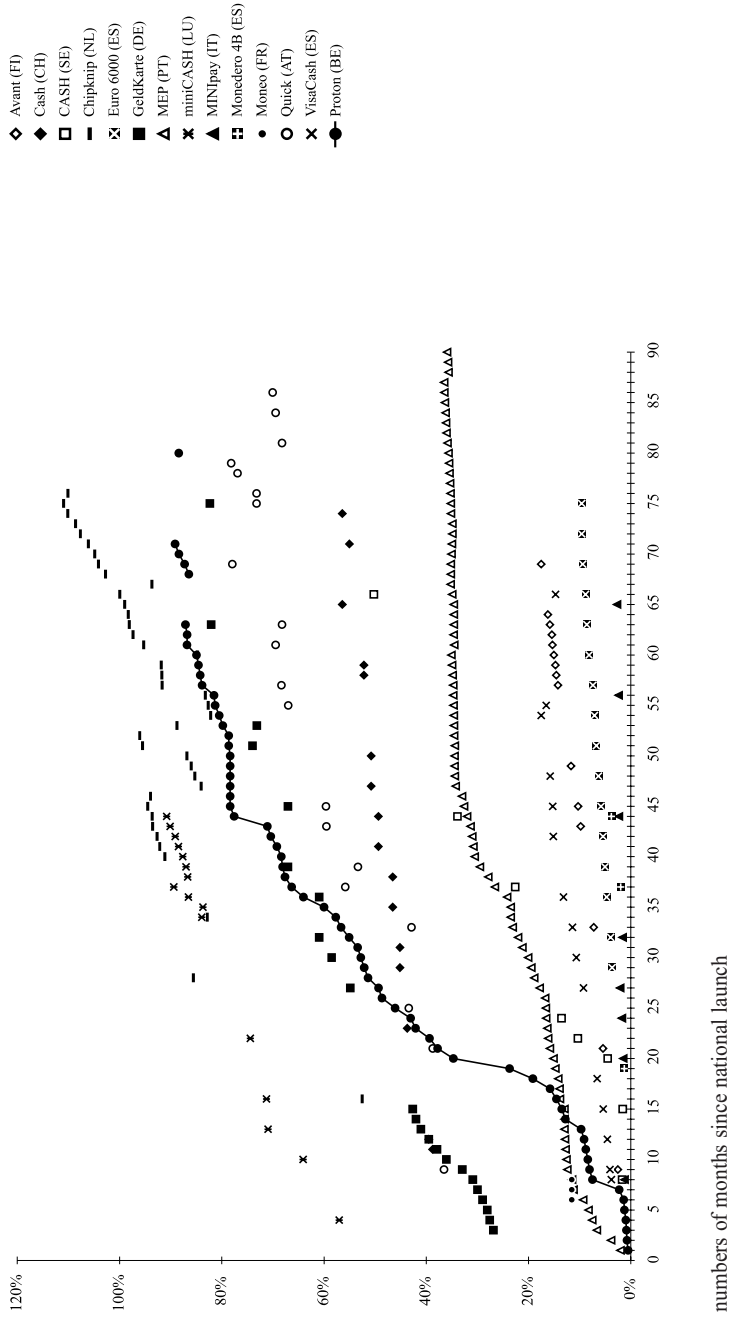


Figure 2 – Number of activated cards (% population)

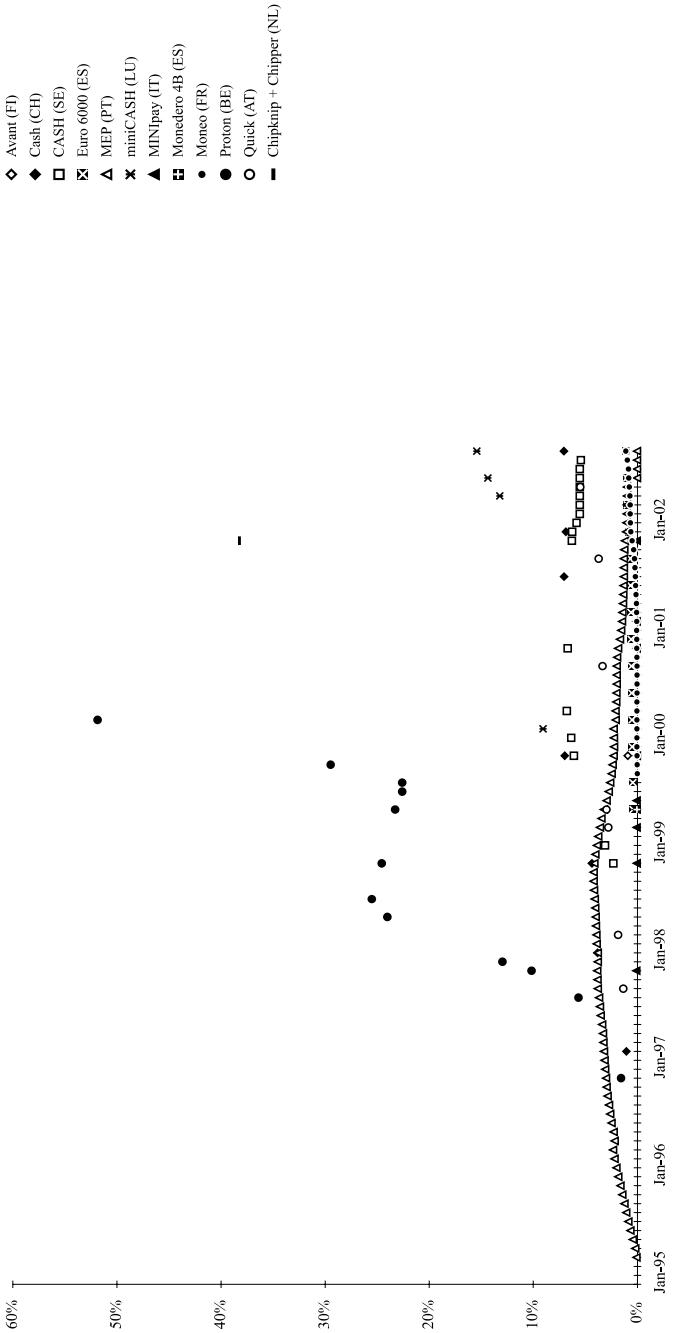


Figure 3 – Number of active cards (% population)

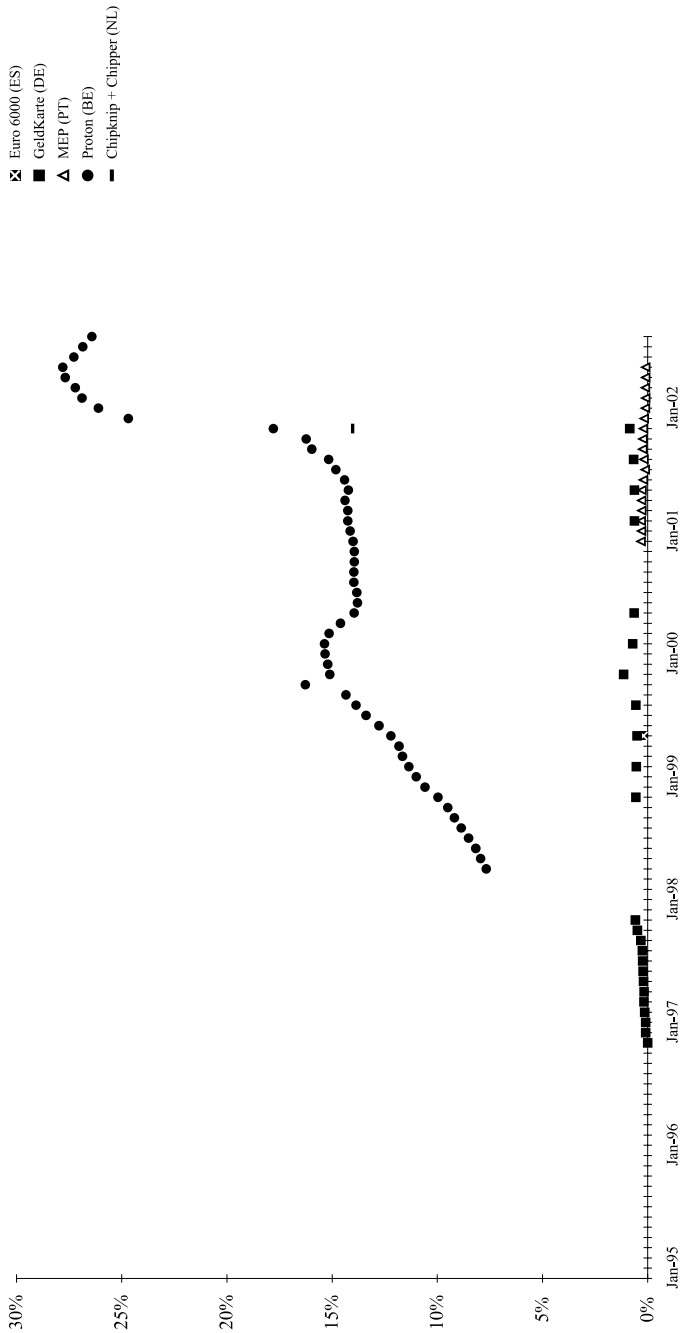


Figure 4 – Number of terminals (per mio inhabitants)

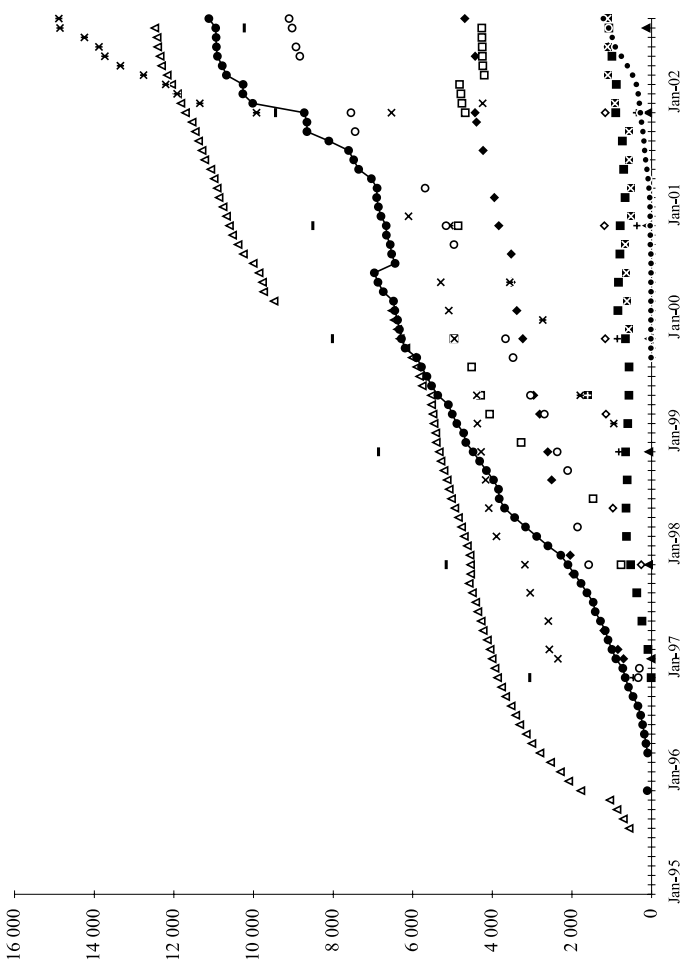
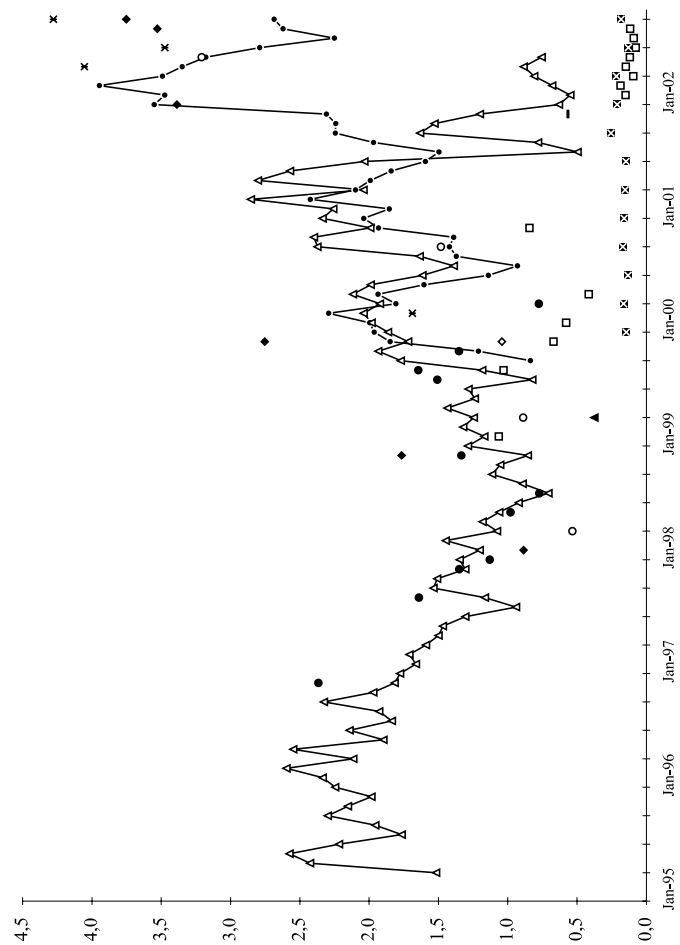


Figure 5 – Frequency of use, all cards (trx per card, per month)

Figure 6 – Frequency of use, activated cards (trx per card per month)



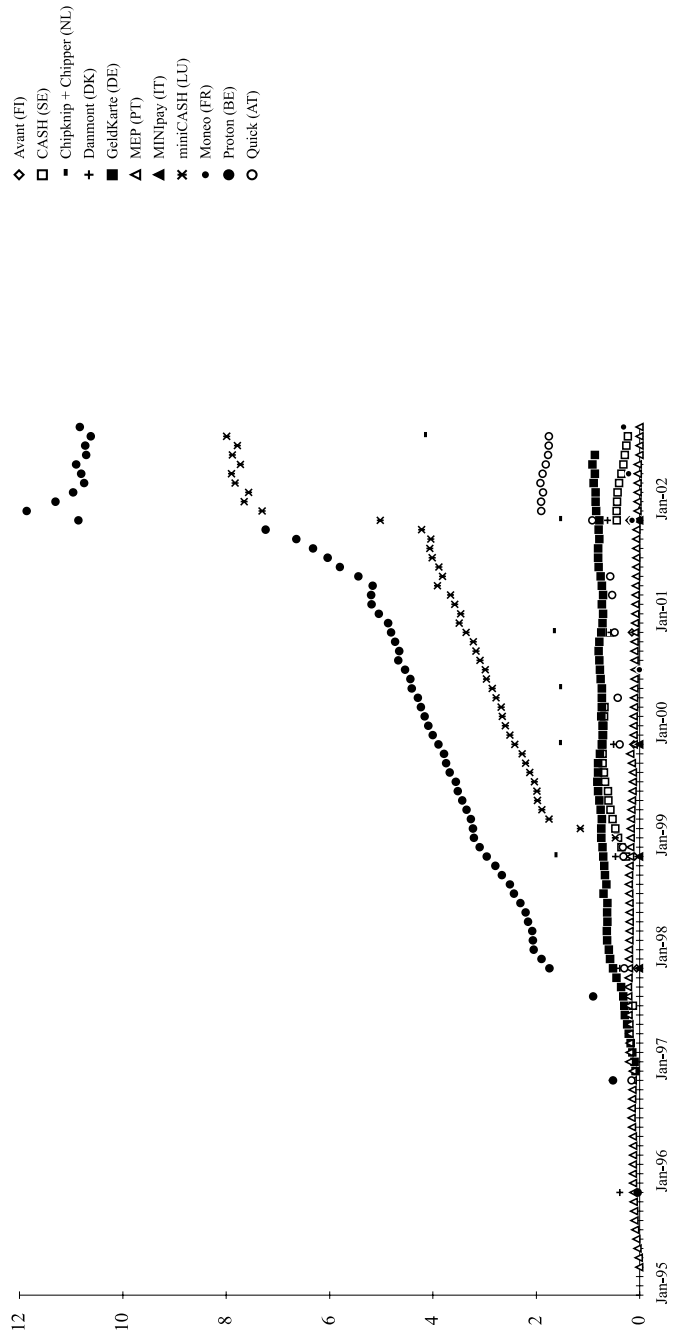


Figure 7 – Float (in euro per capita)

Figure 8a – Number of transactions (per capita per month)

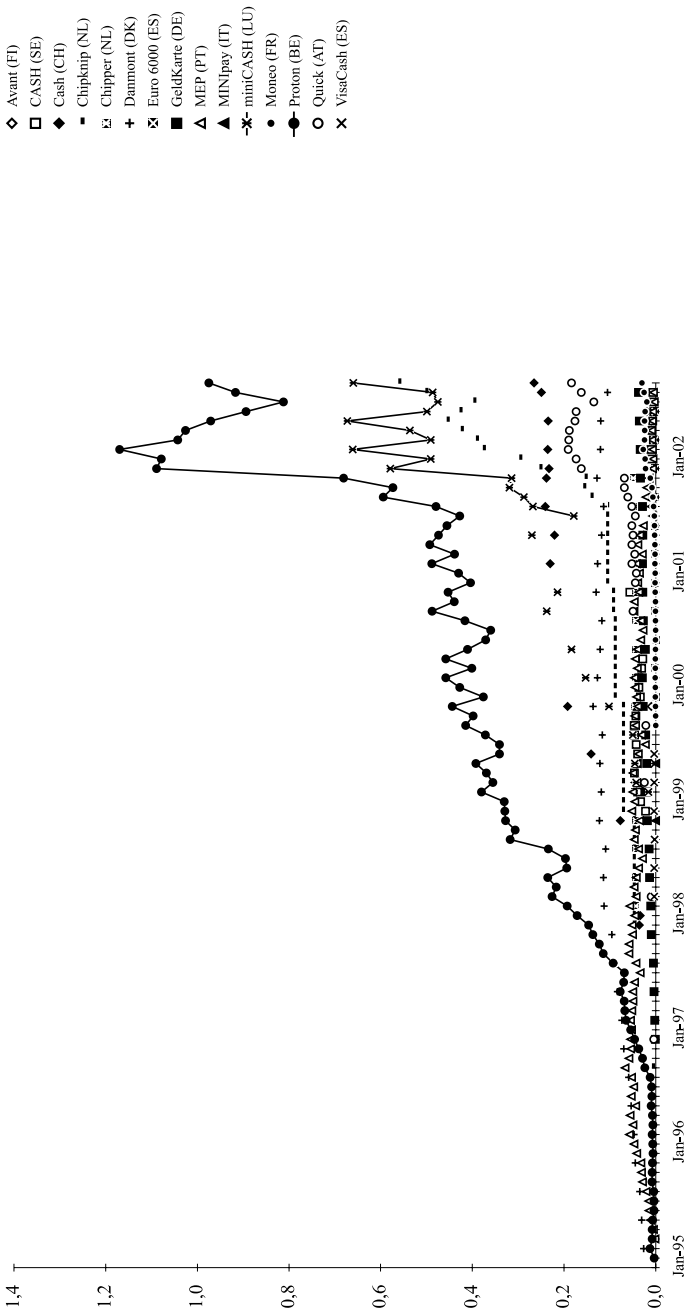


Figure 8a-bis – Number of transactions (per capita per month)

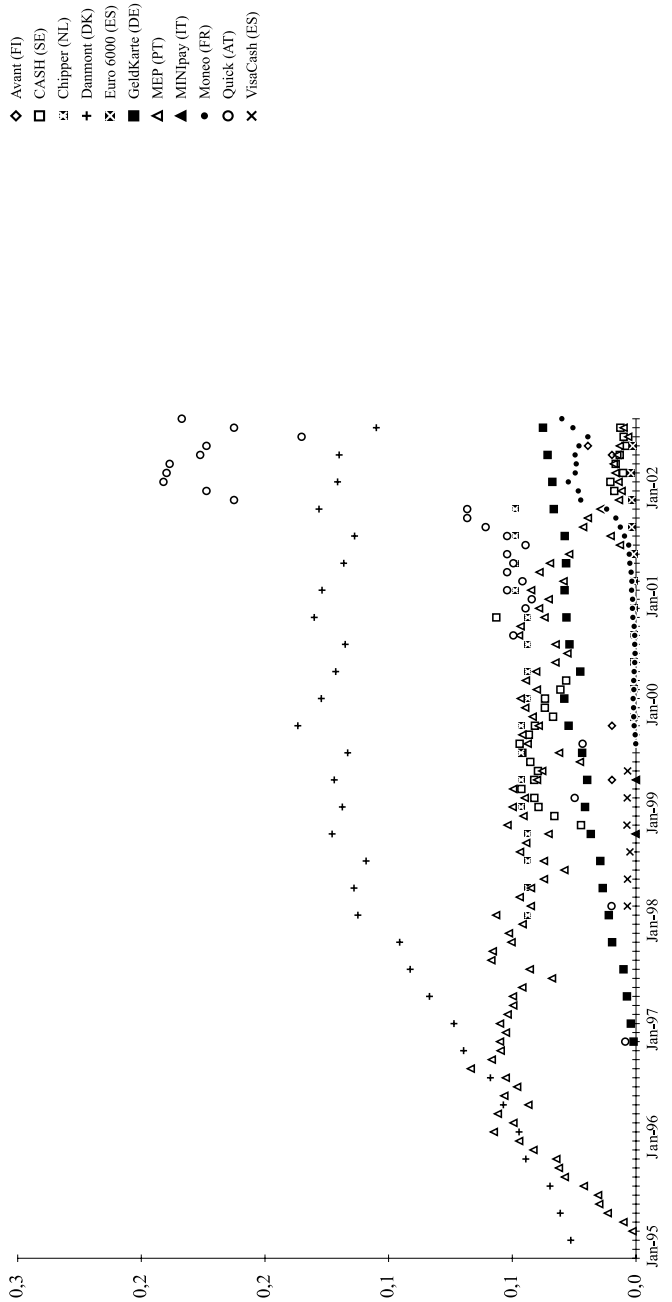
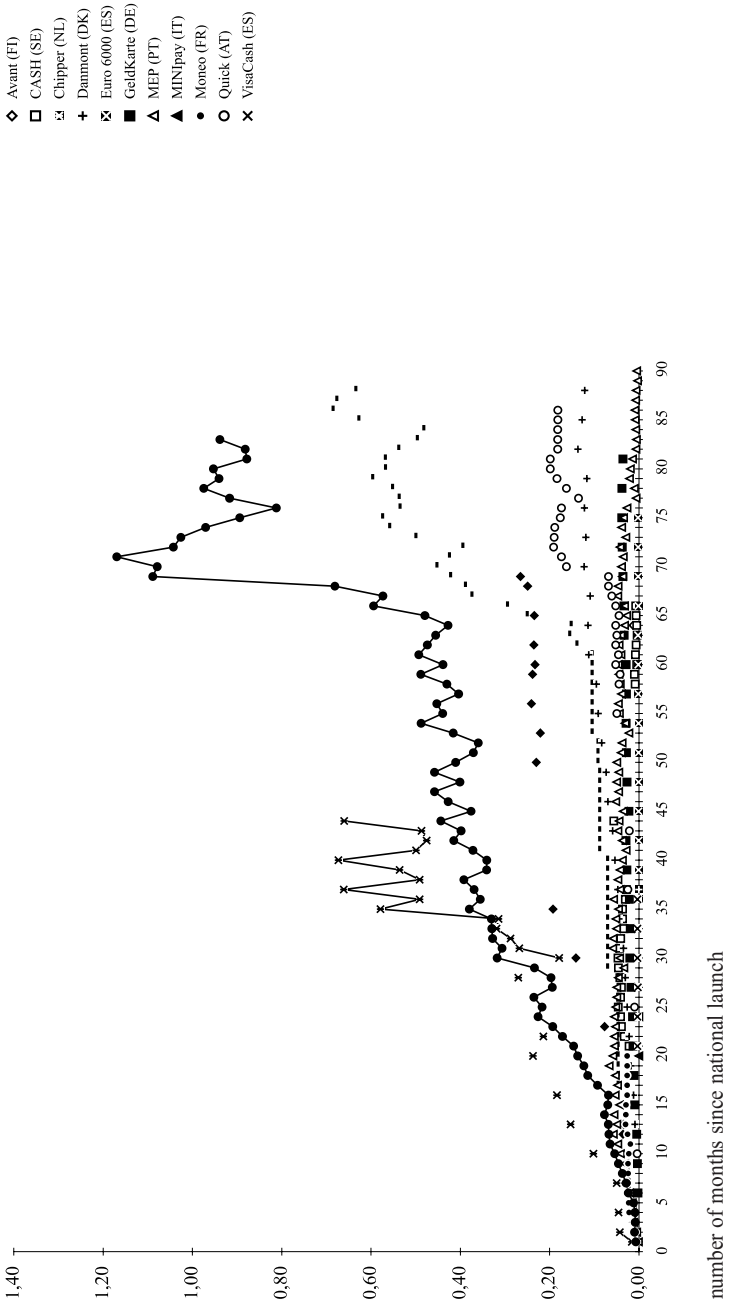


Figure 8b – Number of transactions (per capita per month)



Appendix 2 – Notes to Figures

As explained in the main text, for some graphs two versions are presented: one with a normal time axis and a second one with on the horizontal axis the number of months since roll-out. The latter date is not always straightforward to determine. In most cases I have taken the date at which the scheme was expanded beyond the pilot region. Note that this does not necessarily mean that cards and terminals became available on a nation-wide scale at that point in time. In chronological order, the dates that were used are as follows:

Danmønt	DK	March 1993
MEP/PMB	PT	April 1995
Proton	BE	May 1996
Monedero 4B	ES	June 1996
Visa Cash	ES	July 1996
Chipknip	NL	September 1996
GeldKarte	DE	October 1996
Quick	AT	October 1996
Cash	CH	February 1997
Euro 6000	ES	February 1997
CASH	SE	May 1997
MINIpay	IT	May 1997
Avant	FI	April 1997
miniCASH	LU	March 1999
Moneo	FR	October 2001

Figure 1 – Total number of cards in circulation

Avant (Finland) – The figures relate only to the multi-function card introduced in March 1997 – sometimes termed Avant II – which replaced the original Avant card. In order to have a homogeneous time series, the figures include only reloadable cards. As such the figures used here are in line with the figures reported in the Red Book, but are lower than those mentioned in the Blue Book. The latter also include disposable Avant cards, the last of which were valid until end-2000.

CASH (Switzerland) – The first e-purse scheme in Switzerland was operated not by the Swiss banks but by the Swiss PTT, and began trials as far back as November 1991. For a while it looked like two competing schemes were going to enter the market because the banks also started working on a Proton-based e-purse, with Europay Switzerland functioning as the promoter and Telekurs Payserv as the operator. However, in early 1996 the Post Office and the Swiss banks entered into a strategic alliance[108]. The banks launched the CASH scheme on a national scale in January 1997, with the Post Office joining the system with Postcard Cash in October 1997. This delay was due to the technical adaptations needed to make the Bancomat and Postomat ATMs interoperable (in order to provide a fully compatible loading facility for the CASH purse)[109]. Another reason, pointed out by Clarke (1998), was the following: "The [interoperability] arrangement is problematical from a technical perspective. The PTT's 1.3 million PostCards already carry an ISO7816 chip, a Bull chip which performs the on-line debit-card and Postomat ATM functions. An additional or alternative PostCard will now need to be issued bearing the Proton chip. The two will, of course, be mutually exclusive; and on the new PostCard, the debit-card and ATM functions, if offered at all, will have to migrate back to the magnetic-stripe". Eventually, the Post Office decided to issue an additional kind of Postcard (a blue one), which only includes the CASH capability. The blue Postcard was intended to complement the PTT's mainstream white Postcard (which is an ATM and debit-card, both on chip) and black Postcard (which is a credit-card) (op. cit.). Importantly, this implies that whereas CASH is a supplemental function on the bank-issued ec/Maestro card, Post Office customers have to apply for a blue Postcard. Moreover, they have to fork out a one-time fee of CHF 10[110] (which amounts to CHF 2.50 per year because the card is valid for 4 years) whereas bank customers do not face an additional outlay since the CASH function is included in the annual fee. In 1998, Clarke (op. cit.) asserted that it was not clear that "the PTT [would] market its PostCard ec-Cash option particularly aggressively". An indication that seems to confirm this is that in October 2002 Postcard Cash purses only accounted for some 6% of the total number of activated purses, whereas the Post Office had at end-2000 a market share of 37% in terms of debit cards (Source: own calculations based on the BIS Red Book and Europay Switzerland data).

[108] Telekurs, Enge Zusammenarbeit zwischen der Post und den Banken im Bereich des Plastikgeldes, press release, February 1, 1996.

[109] Source: Raffeisenbanken, Cash will dem Münz an den Kragen, *Panorama* (Die Kundenzeitschrift der Raffeisenbanken), May 1997.

[110] Source: web site of Die Post, consulted on January 16, 2003.

CASH (Sweden) – Just like its namesake in Switzerland, the CASH scheme in Sweden uses Proton technology. The original Proton licence was taken out in March 1996 by Nordbanken (now Nordea) and FöreningsSparbanken (Swedbank), who were joined in 1997 – that is, after the 1996 pilots in Uppsala and Halmstad – by S-E Banken (PWI, 1999). According to the first 'Survey of Electronic Money Developments' published by the BIS (CPSS, 2000, p. 79), these three banks together had over 70% of the Swedish bank card market, both as issuers and as acquirers. A fourth bank, Svenska Handelsbanken, entered the consortium three years later than its peers, in June 2000 (PWI, 2000). According to ECR (2000b), this meant that the CASH purse was supported by "90% of the Swedish retail banking sector". The second 'Survey of Electronic Money Developments' talks about "80% of the Swedish bank card market" (CPSS, 2001, p. 76).
Note that earlier versions of this paper made mention of (much) higher CASH penetration rates. These were based on figures taken from the PWI web site. However, on closer scrutiny these figures turned out to suffer from double-counting, in the sense that whenever a debit card was renewed the new e-purse id was counted without removing the old e-purse (Source: Geuken, Fr., personal e-mail, April 4, 2003).

Chipknip (the Netherlands) – The bulk of the Chipknip purses are incorporated into debit cards (and are thus linked to a bank account). However, on 1 January 2002 Interpay launched the 'Prepaid Chipknip' – a stand-alone, disposable card for tourists and people without a bank account[111]. This prepaid card was mainly introduced because a number of municipalities saw the introduction of the euro as the perfect moment to start collecting parking fees electronically and do away with cash payment and the associated vandalism[112]. As of 1 January 2002, the use of an e-purse has become compulsory at all parking meters in the cities of Rotterdam and Nijmegen, and in Purmerend[113]. An important precondition imposed by the new government decree which made the 'chip-only' collection of parking fees possible, was the presence of sufficient sales points where people could use cash to buy a disposable e-purse. The Prepaid Chipknips are *not* included in the figures presented in Figure 1. Interpay has no data on the number of Prepaid Chipknips used in a particular period. They only know how much were sold to resellers. In 2002, this number was 325,000 (Interpay, Annual Report 2002).

[111] Source: Interpay, Parkeren eenvoudig met Chipknip of Chipper, press release, January 10, 2002 <http://www.interpay.nl/content/dynamic.asp?mode=leftmenu&id=1838 >.

[112] Source: De Nederlandsche Bank, Current developments in payments and securities transactions, *Quarterly Bulletin*, March 2001, p. 26 <http://www.dnb.nl/>.

[113] Source: De Nederlandsche Bank, *Quarterly Bulletin*, March 2002, p. 25.

The drops in the number of issued cards that are apparent in Figure 1 are mainly due to data revisions by Interpay (Source: Vergoossen, A., personal e-mail, February 7, 2003). The increase in the number of cards from April 2002 onwards is due to the demise of the competing Chipper scheme (see below), and the subsequent replacement of Chipper cards by Chipknip cards. A final note is that the current Chipknip penetration rate exceeds 100%. This is because many people in the Netherlands have accounts with more than one bank.

Chipper (the Netherlands) – This scheme no longer exists. Its history can be summarized as follows. For more than three years, two groups in the Netherlands battled for EP supremacy. On one side was the country's major phone company, KPN Telecom, and a big retail bank, Postbank, which issued Chipper cards. On the other side were the rest of the Dutch banks (united in operator Interpay), which issued the Chipknip EP based on Proton technology from Banksys. However, in April 1999 the two schemes eventually signed an agreement outlining a commitment to ensure interoperability (CPSS, 2000, p. 63). In March 2001, Postbank and ING Bank decided to abandon their Chipper technology altogether, phase out the Chipper brand, and migrate to Chipknip by early 2002[114]. ING Bank gradually equipped all its bank cards with a new chip; Postbank opted for a separate Chipknip card next to the existing debit card[115]. On 1 May 2002, merchant acceptance of Chipper cards came to an end, and on 1 July 2002 Chipper Nederland ceased to exist as an organisation[116].

Danmønt (Denmark) – This scheme is not included in the graph because the Danmønt purse is only available as a disposable card so that the figures would not be comparable with those for other schemes (for which typically all or the bulk of the cards are reloadable).

Proton (Belgium) – The Proton card was initially available as a stand-alone card only. It was only at the turn of 1996–1997 that the Belgian banks started mounting the Proton EP on their debit cards. Note also that the Proton card was introduced across Belgium in phases. Nation-wide coverage was achieved at the beginning of 1998.

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[114] Source: Nederlandse Vereniging van Banken, Banken over op één chiptechnologie, press release, March 5, 2001 <http://www.nvb.nl/pages/publicaties/persberichten.asp#14>.

[115] Source: Nederlandse Vereniging van Banken, Gebruik chipkaarten neemt toe, *NVBulletin*, Nr. 1, March 2002, p. 1-3 <http://www.nvb.nl/files/nvbulletin1maart2002.pdf>.

[116] Source: Interpay, Chipper is niet meer, *Betaalwijzer*, Nr. 2, July 2002, p. 11.

Quick (Austria) – The Quick purse is not only included on bank cards, but can also be found on 'Quick-only' cards that are not linked to a bank account, such as affinity cards issued by drugstore chains. Initially, the relative importance of this type of cards was limited: at the end of 1996 and 1998 there were respectively 20,000 and 200,000 Quick-only cards in circulation. However, by the end of 2000 this number had increased to 1,271,000 – thus accounting for some 50% of the overall growth in the number of cards between end-1998 and end-2000 (Europay Austria annual reports; Van Hove, 2000, footnote 16). Importantly, however, many holders of affinity cards never make use of the e-purse function. An interesting example is the 'BIPA Best Card' launched in 2000 by the BIPA drugstore chain. Because the card was free for customers, many signed up but the vast majority only used it for the chip-based loyalty scheme. According to Robert Komatz, Product Manager Pay Before at Europay Austria, "98% of these cards have never been loaded and used for payment transactions". It was therefore clear, according to Komatz, that these cards would not be renewed after expiration. This is indeed what happened at the end of 2002: some 700,000 cards disappeared from the statistics. The loyalty scheme is, however, still operational. Customers can now simply activate the BIPA loyalty scheme on their Maestro cards. Customers who do not have a Maestro card can obtain a personalized chip card from BIPA. These cards do not, however, contain the Quick e-purse because they are only equipped with a low-cost memory chip (Source: Komatz, R., personal e-mail, January 22, 2003).

Visa Cash (Spain) – According to Carmen Carnero, general deputy manager Visa España/SERMEPA, the drop in the number of cards between December 2000 and December 2001 is due to "the imminent migration to EMV + CEPS. Financial institutions are cleaning up their portfolios to get ready for the migration process" (Source: Carnero, C., personal e-mail, September 12, 2002).

Figure 2 – Number of activated cards

See main text for the definitions used by the respective schemes.
Proton (Belgium) – The decrease in the number of activated Proton cards during 1999 is a statistical anomaly which is due to the fact that Banksys revised its calculations.

Figure 3 – Number of active cards

See main text for the definitions used by the respective schemes.

Figure 4 – Terminals

In principle, the figures relate to active terminals; that is, terminals which have performed at least one transaction.

CASH (Sweden) – The sudden drop in the number of CASH terminals between March and April 2002 is due to the removal of inactive terminals (Source: Geuken, Fr., personal e-mail, April 17, 2003).

Euro 6000 (Spain) – Figures relate to the Euro 6000 network alone even though CECA has an agreement with Sistema 4B about Euro 6000-Monedero 4B interoperability for purchase transactions (not for loading transactions)[117]. However, I have no data on the number of Monedero 4B terminals. Also, "the number of interchange operations is less than 1 percent of the total"[118].

Just like the Visa Cash card (and the Monedero 4B, for that matter), the Euro 6000 purse is accepted as a payment method by Canal Satélite Digital[119]. These set-top boxes are not included in the figures presented in Figure 4. According to Antonio de Andrés Turrión, the number of transactions is low: "We have less than 1,000 transactions per month and there are about 2 million set-top boxes"[120].

GeldKarte (Germany) – Figures were taken from the S-CARD website and relate to *active* terminals. This explains why the figures are lower than those reported by the Bundesbank. All data are quarterly data (average over period) – except for the observation for July 2003 – and are presented as an observation for the final month of the quarter.

Visa Cash (Spain) – Prior to 2002, terminals include Teléfonica's public phone booths (see main text). Today, more than 25 universities have Visa Cash programs as have 8 local transportation companies (mainly in city buses). Since July 2000, Visa Cash cards are accepted at all 1,8 million Canal Satélite Digital set-top boxes to pay for pay-per-view programs (Carnero, 2002a and 2002b). These set-top boxes are, however, *not* included in the figures presented in Figure 4 as this would distort the overall picture.

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[117] Fernandez Caro, S., Visa y 4B se unen para dar un nuevo impulso al monedero electronico, *Noticias de Bolsa de Madrid*, July 12, 1998.

[118] Source: de Andrés Turrión, A., personal e-mail, September 4, 2002.

[119] Source: Chip and credit cards will be able to be used with Canal Satélite decoder, *El Pais Digital*, December 22, 1999 <http://www.intelligentdata.es/news/22-12-99-1.html>.

[120] Source: de Andrés Turrión, A., personal e-mail, September 18, 2002.

Figure 5 – Frequency of use, all cards

CASH (Switzerland) – The transactions data for 2001–2002 were quarterly data which I converted into monthly figures (for the final month of the quarter).

Chipknip (the Netherlands) – Usage figures are biased upward because Prepaid Chipknips are not included in the card figures.

Figure 6 – Frequency of use, activated cards

See main text for the definitions of 'activated card' used by the respective schemes.

Figure 7 – Float

CASH (Sweden) – According to Mr. Geuken, the drop in the float in May–September 2002 is a statistical anomaly due to the introduction of a new release of the Proton Host System in April 2002 (Source: Geuken, Fr., personal e-mail, April 17, 2003).

Figure 8 – Number of transactions

CASH (Switzerland) – As in Figure 5, quarterly data have been converted into monthly observations.

Chipper (the Netherlands) – As is apparent from the lack of variability, yearly figures were used here.

Danmønt (Denmark) – Based on quarterly data.

Moneo (France) – The figures for January–May 2003 are averages.

Visa Cash (Spain) – The Visa Cash transaction data provided by SERMEPA were quarterly data, which I converted into monthly data. However, since both the number and value of transactions remained virtually constant throughout the period covered, the conversion should entail only minor distortions.

Quick (Austria) – The figures for November–December

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