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Central Banks and Payment Instruments: a Serious Case of Schizophrenia

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Abstract: This article analyses the competition between cash and payment cards against the backdrop of the dual role of central banks - as issuers of cash and as institutions with a mandate to foster the efficiency of payment systems in general. It is argued that this dual role results in a number of policy dilemmas, namely concerning pricing, traceability of banknotes and the choice of denominations of coins and banknotes. On a general level, the article argues that central banks should place greater emphasis on improving the efficiency of retail payments and less on protecting their self-interest. More concretely, the article repeats the suggestion - originally put forward in VAN HOVE & VUCHELEN (1996) - that the ECB should place the upper limit of its banknote series at EUR 50 instead of EUR 500. It is also argued that policy makers should explicitly foster the use of cost-based pricing and in particular create a legal environment that makes it possible for commercial banks to start using it.

Key words: payment instruments, central banks, cash, banknotes, payment cards, public policy, efficiency.

Payment instruments are no ordinary products. Hence, the market for payment instruments is no ordinary market. On the demand side, there is, for example, the fact that consumers make high demands in terms of security and reliability. At the same time, the demand for payment instruments is 'only' a derived demand: what consumers really want is the goods or services that they can pay for with the payment instruments. SPENCER (2003, p. 305) therefore talks about 'convenience goods', "wanted not for [their] own sake but as a way to access other goods and services". This has several implications. One is that overall the price

(*) I am indebted to Simon Lelieveldt (Nederlandse Vereniging van Banken), whose intervention as a discussant at the 9th Research Conference of De Nederlandsche Bank sparked the concept of this paper (See: LELIEVELDT S., "Recognizing cash: the Dutch experience", Presentation as a discussant at the 9th DNB Research Conference on "Recent Developments in Payment Economics", De Nederlandsche Bank, Amsterdam, November 10th, 2006 <<http://www.simonl.org/docs/woconf06cash.pdf>>). He has also guided me to additional references. Thanks also go to David Bounie, Charles Goodhart, Nicole Jonker, Harry Leinonen, and Marco Wind for comments and/or background information.

elasticity of demand for payment instruments is low. If the cost of transactions goes up, consumer demand for goods and services is unlikely to change, as is the level of transactions that they make¹. Another implication is that payment services are a difficult product to sell. As the Dutch banks recently put it: "payments (services) are a hygiene factor; a dissatisfier (as opposed to being a motivation factor or satisfier). This means that the nature of the services is such that a faulty provision of services leads to dissatisfaction and complaints. On the other hand, a proper delivery of services does not lead to additional satisfaction"². Still on the demand side, there is the fact that payment instruments are subject to network externalities, in that the value that a person gets from using a specific payment instrument increases as more people use it. This has a fundamental impact on the market structure, and is something that payment service providers have to explicitly take into account in their marketing and pricing decisions³.

Turning to the supply side, a distinguishing feature of the market for payment instruments is that not just any company can start offering them. Regulators are big on consumer protection and financial stability, and therefore typically limit entry into the market - if not to credit institutions *pur sang*, then at least to institutions that comply with specific requirements in terms of capital adequacy, etc. In the EU, for example, the Electronic Money Directives oblige non-bank issuers of e-money to become an Electronic Money Institution as soon as the scheme reaches a certain geographical coverage and/or certain levels of financial liabilities. Also on the supply side, unlike many other markets, there is competition between private and public players. For example, commercial banks and the central bank are both active in the market for Point of Sale (POS) payments; the former as issuers of all sorts of payment cards⁴, the latter as issuers of coins and banknotes. All this is further compounded by the fact that the big-is-beautiful impact of network externalities - which are often called demand-side economies of

¹ This is not to say that the demand for individual payment instruments is price inelastic. HUMPHREY *et al.* (2001), for example, show that Norwegian consumers are quite sensitive to changes in the price of payment services. See also the paper by De GRAUWE *et al.* (2006), mentioned below.

² Source: Nederlandse Vereniging van Banken, Reply of Dutch banks to the Second Interim Report on Current Accounts and Related Services, letter to the European Commission, October 12, 2006, p. 9.

³ See VAN HOVE (1999), VERDIER (2006), and KEMPPAINEN & SALO (2006) for an in-depth discussion of the implications of the existence of network externalities.

⁴ Next to similarly regulated non-banks; cf. *supra*.

scale - is reinforced by the existence of 'traditional' economies of scale on the supply side. Indeed, whereas significant investment in infrastructure is needed to start a payments scheme, the marginal cost of services produced over the existing infrastructure is typically relatively small. Hence, it is no surprise that Bergman, for example, argues that "returns to scale appear to be stronger in payment systems than in other banking services" (2003, p. 29).

Finally, on the intersection of demand and supply, there is the issue of pricing of payment instruments, which again differs from the way prices are set in 'ordinary' markets. Indeed, in several countries users hardly face any direct, per-transaction charges as there is a tradition of offering payment services for free or below cost. A recent study commissioned by the Netherlands Bankers' Association and De Nederlandsche Bank, and carried out by McKinsey, for example, found that in 2005, the Dutch banks incurred a loss of no less than EUR 101 million on their debit card business - or a loss of 8 cents per transaction (McKINSEY, 2006). In fact, according to the same study, the banks in the Netherlands incur losses on most payment instruments. The implication is that they make heavy use of cross-subsidisation. The same is true in other countries.

Recapitulating, the market for payment instruments differs from other markets in multiple respects. This article focuses on only one of these respects; namely, the competition between commercial providers - both banks and non-banks - and the central bank. It is argued that this puts the central bank in a schizophrenic position, and results in a number of policy dilemmas where the central bank is torn between its commercial role as a payment service provider on the one hand, and its public responsibility to foster the efficiency of payment systems on the other. In highlighting these dilemmas, the paper limits itself to retail payments, and more precisely to the competition, at the POS, between cash and payment cards (broadly defined). In other words, it does not discuss the operational involvement of central banks in clearing and settlement systems⁵ and also avoids the broader question of whether specific (electronic) payment instruments have in fact become public goods and should be provided by central banks⁶.

⁵ Recently, plans by the European Central Bank to set up its own cut-price securities settlement system (the so-called Target2-Securities), met with resistance from Europe's finance ministers, amid fears it could become a 'public monopoly' accountable to no one (Source: "Ministers hit ECB securities settlement plan", *Financial Times*, January 21st, 2007).

⁶ I refer to VAN HOVE (2005) for an analysis of the ambition of the monetary authorities in Singapore to start issuing electronic money.

Finally, the paper does not examine possible conflicts between the operational and oversight roles of central banks ⁷.

The remainder of this article is structured as follows. The following section first sets out the core, high-level dilemma that central banks are faced with concerning POS payments: the possible conflict between their task as the promoter of cash and their mandate to improve the efficiency of payment systems in general. The subsequent sections then go one level lower and discuss, one by one, how this dilemma might impact concrete public policy debates. The paper looks at measures that could be taken with the explicit purpose of promoting payment cards - such as a move to cost-based pricing - as well as other central bank decisions that are primarily taken with other goals in mind, but that nevertheless influence the relative attractiveness of cash versus payment cards - including decisions concerning anonymity and the fight against counterfeiting, and concerning the denominational structure of the euro.

■ Seigniorage or efficiency?

As already mentioned above, central banks typically have the explicit legislated objective to foster the efficiency of payment systems. As far as the European Central Bank is concerned, its interest in the efficiency of payments systems is based on Articles 3 and 22 of its Statute. Article 3 stipulates that in accordance with Article 105(2) of the Treaty, one of "the *basic* tasks to be carried out through" the European System of Central Banks shall be "to promote the smooth operation of payment systems" (my emphasis). Article 22 (on clearing and payment systems) specifies that "the ECB and national central banks may provide facilities, and the ECB may make regulations, to ensure efficient and sound clearing and payment systems within the Community and with other countries". In line with this, in a recent article entitled 'Towards a cashless society', the Dutch central bank

⁷ In 2007/08 the Reserve Bank of Australia will review the local credit and debit card systems, as well as the Bank's 2002 reforms of these systems. In preparation for this review, in September 2006, the Bank sought submissions from interested parties on the content of the review and how it might best be undertaken. Interestingly, "one issue raised in a number of submissions and considered in depth by the Board was whether a body other than the Bank should conduct the review" (Source: Reserve Bank of Australia, 2007/08 review of payment system reforms, media release, December 11th, 2006. <http://www.rba.gov.au/MediaReleases/2006/mr_06_13.html>).

explicitly states that: "it is among DNB's *chief* duties to see to a secure, smooth and efficient payment system" (DNB, 2006, p. 66; my emphasis).

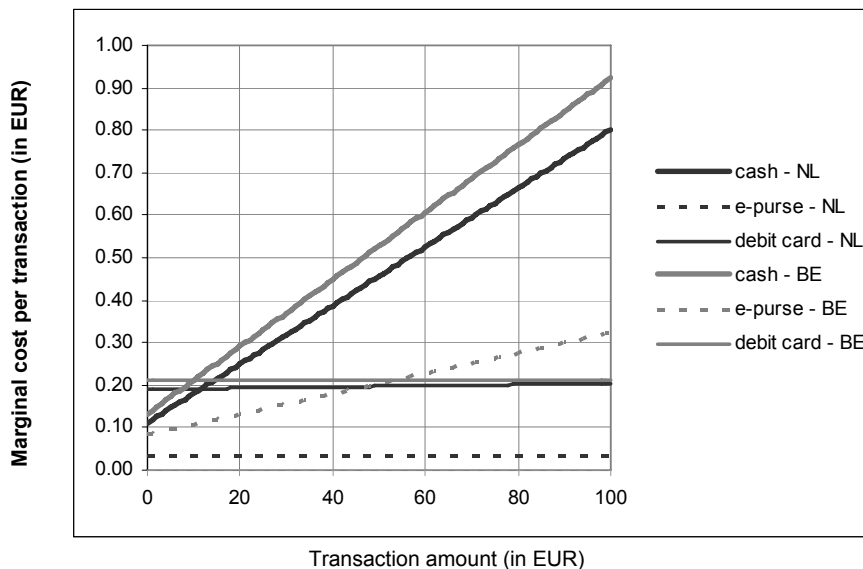
However, the problem for central banks is that a number of recent studies - several of which were conducted by central banks themselves - reveal that cash, their own product, is not the most efficient of payment instruments. Clearly, when thinking about the efficiency of payment systems, the yardstick to use is not private costs, but rather social or societal costs. The social cost of a payment instrument refers to the resources that society as a whole consumes in providing and using the service. It is computed by adding up the private costs of all stakeholders (consumers, merchants, commercial banks, the central bank, etc.), and eliminating any transfer payments - in order to avoid double counting. It is intuitively clear that the circulation of notes and coins is labour-intensive and thus costly. However, until recently, estimates of the social cost of cash were scarce and not very reliable. There were also hardly any consistent comparisons of the social cost of cash with that of electronic payment instruments. As far as the Netherlands and Belgium are concerned, this lack of hard evidence has been remedied by two recent studies led by the respective central banks (De Nederlandsche Bank, 2004; Steering Committee, 2005; National Bank of Belgium, 2006)⁸. Both studies focus on estimating the social cost of POS payments; i.e., excluding remote and P2P payments. Before discussing the results, it should be pointed out that the payment systems of the Netherlands and Belgium are very similar: in both countries cheques have all but disappeared, debit cards are far more popular than credit cards, and they both have an e-purse scheme called Proton in Belgium and Chipknip in the Netherlands.

The results are as follows. According to the study by the Dutch central bank, which relies on data for 2002, the overall social cost of POS payments in the Netherlands would be equivalent to EUR 2.9 billion per year, or 0.65% of Dutch GDP. The figure put forward in the study led by the National Bank of Belgium - which essentially replicated the methodology used by De Nederlandsche Bank but relates to 2003 - is even higher, at least in relative terms (0.74% of GDP). Crucially, in both countries cash is responsible for the lion's share - 73% and 75%, respectively - of the total social cost. In the

⁸ Interestingly, the Bank of Finland also has a study in the pipeline (cf. *infra*), and the Reserve Bank of Australia recently announced that as part of its 2007/08 review of payment system reforms (see previous footnote) it will undertake "a comprehensive study of the resource costs involved in different methods of payment, including cash" (Source: Reserve Bank of Australia, 2007/08 review of payment system reforms, media release, December 11th, 2006. <http://www.rba.gov.au/MediaReleases/2006/mr_06_13.html>).

Netherlands, the social cost of cash would amount to no less than 0.48% of GDP - or EUR 300 per family per year. The figure for Belgium is even higher: 0.58% of GDP. As points of comparison, a recent study by the Oesterreichische Nationalbank (SCHAUTZER, 2007, p. 148) estimates the cost of cash at 0.47% of GDP (or almost identical to the Netherlands), whereas a forthcoming study by the Bank of Finland puts it at only 0.10-0.15% of GDP ⁹.

Figure 1 - Marginal social costs, Netherlands and Belgium



⁹ The figure of 0.1% is mentioned in MOOSLECHNER *et al.* (2006, p. 112), who refer to Bank of Finland, Cost of cash, forthcoming. According to the author of the study, Kari Takala, the figure has been inflated to 0.15% in the meantime as more reliable estimates of the costs incurred by commercial banks have become available (Source: Takala, K., private e mail, January 11th, 2007). The large difference between the Finnish estimates and those for Belgium and the Netherlands is probably related in no small part to the fact that Finland has always had the lowest currency/GDP ratio in the EU: in 2000 it was 2.2%, compared to 4.2% in the Netherlands and 4.8% in Belgium (Source: ECB, Blue Book Addendum incorporating 2001 figures, September 2003, p. 9). However, Austria's currency/GDP ratio in the same year was no less than 5.9% (*ibidem*), making it surprising that the social cost of cash is no higher than in the Netherlands. SCHAUTZER (2007, p. 147) also makes this observation and argues that it "points to the efficiency of organization in cash logistics" in Austria. Note that I have used pre-Euro figures because since the introduction of the Euro only the so-called logistical currency in circulation is known for Euro zone countries. This is defined as the difference between the value of banknotes issued in a given country and the banknotes removed from circulation in the same country, and will typically fail to give a correct picture of the actual amount of currency in circulation within the country. Moreover, I have refrained from using figures for 2001, the final pre-Euro year, because these figures are distorted as a result of significant dishoarding in the run-up to the Euro.

One could argue - and with reason - that it is only normal that the social cost of cash is higher than that of its electronic competitors in Belgium and the Netherlands, because the bulk of payments are still conducted by means of cash even today. For example, in 2003 cash would still have been used in no less than 81% of POS transactions in Belgium (Steering Committee, 2005). Crucially, however, the central bank studies show that the marginal social cost of cash is also higher. This is illustrated in figure 1, which compares, for the two countries, the marginal social cost of cash (as a function of the transaction amount) with that of e-purses and debit cards. To be clear: we are looking here at the cost, for society, of making one additional payment of a certain size; fixed costs are thus not included. In other words, the implicit assumption is that the infrastructure is already available.

A first observation is that the results for the two countries tally well, except for the e-purse. This is surprising because the Dutch banks have simply licensed Proton technology from Banksys - the Belgian EFTPOS operator - and rebranded it. However, the comparison across payment instruments is what matters here. Importantly, in both countries e-purses are more cost-efficient than cash, regardless of the amount of the transaction. In the Netherlands, one additional e-purse payment would cost society a mere EUR 0.03. Comparatively, one additional cash payment would cost a minimum of EUR 0.11 - and this figure rises considerably in accordance with the amount to be paid. The conclusion is clear: society would benefit from a substitution of cash by e-purse payments. For Belgium, the conclusion is similar¹⁰. Turning to debit cards, a similar comparison of marginal costs shows that in both countries cash is still more economical than debit cards for small payments. Yet because the cost of cash increases with the transaction amount, this is not the case for larger transactions. In the Netherlands, the switching point lies at EUR 11.63; in Belgium it lies at EUR 10.24.

¹⁰ It must be stressed, however, that while in Belgium the costs associated with the Proton e-purse are also always lower than those of cash, as soon as the transaction amount reaches EUR 53.74, Proton becomes more expensive for society than the debit card. On the other hand, the probability of consumers using an e-purse for higher-value transactions in situations where they can also pay by means of a debit card is small as it increases the risk of theft and loss, and necessitates frequent reloading of the card. This issue is aggravated by the fact that there is an upper limit to the amount that can be stored on the card. For Proton this sum is EUR 125.

Again the message is that society would benefit from discouraging the use of cash, at least for transactions above the switching point ¹¹.

In its report, De Nederlandsche Bank therefore concludes that the use of debit cards and e-purses should be encouraged (DNB, 2004, p. 57) ¹². This may seem a straightforward policy conclusion, but it is particularly brave for a central bank as such a policy goes against its own product, cash. In fact, this lies at the essence of the cruel dilemma that central banks are faced with concerning POS payments: in view of their mandate to foster efficiency, they should try to lower the social cost of such payments by promoting - or helping to promote - debit cards and e-purses, but in so doing, they would reduce the use of their own product, and hence the seigniorage income that they derive from it ¹³.

¹¹ The attentive reader may have noticed that credit cards do not appear in figure 1. This is because they are considerably more expensive than both debit cards and cash (except, where cash is concerned, for higher-value transactions). Hence, credit cards are not useful as a means of improving the efficiency of the payment system, which explains why they are not mentioned in the remainder of this article.

¹² An important caveat here is that costs are only one side of the coin. The benefits of payment instruments - such as ease of use and safety - should also be taken into account. However, this point is not elaborated further here. The reader is referred to GARCIA SWARTZ *et al.* (2004).

¹³ Two important caveats are in order here. First, to the extent that seigniorage on notes and coin accrues to the government - rather than the central bank - there is less of a dilemma. Where the UK, for example, is concerned, the Bank of England's Annual Report for 2006 explains that the "Bank Charter Act 1844 requires that the Bank's note issue function be separated from its other activities. Accordingly, for accounting purposes, the Bank is divided into 'Issue' and 'Banking.' The Issue Department is solely concerned with the note issue, the assets backing the issue, the income generated by those assets and the costs incurred by the Bank in printing, issuing, sorting and destroying notes. *The entire profit of the note issue is paid over to HM Treasury*" (Source: Bank of England, Annual Report 2006, May 2006, p. 35, emphasis added. www.bankofengland.co.uk/publications/annualreport/2006report.pdf).

A second caveat is that in the Euro zone, seigniorage is allocated by a formula unrelated to national use of cash. Indeed, under Article 32 of the Statute of the European System of Central Banks, the aggregate net monetary income is reallocated to the Euro area national central banks (NCBs) in proportion to their respective shares in the ECB's fully paid-up capital. And pursuant to Article 29 of the Statute, the shares of the NCBs in the ECB's capital are weighted according to the shares of the respective member states in the total population and the GDP of the EU, in equal measure. These weights are adjusted every five years and whenever new member states join the EU (See European Central Bank, Decisions on the issue of Euro banknotes and on the allocation of monetary income, press release, December 6th, 2001 <http://www.ecb.eu/press/pr/date/2001/html/pr011206_1.en.html>, and HANDIG & HOLZFEIND, 2007, for more details). Hence, as long as seigniorage is allocated irrespective of which NCB actually earns this income, for individual central banks in the euro area the dilemma described in the main text is significantly less painful. Stronger still, one could argue that they can even 'free ride' to a large extent: if they discouraged cash usage, the resulting drop in seigniorage would not be felt in full. However, collectively the dilemma is there, and the same is true for the ECB itself. Note that the ECB is allocated 8% of the total value of Euro banknotes in circulation (HANDIG & HOLZFEIND, 2007).

Note that the DNB has also made a rough simulation of the potential savings in social costs. Concretely, the DNB has calculated that a scenario in which 1,500 million cash transactions were replaced by electronic payments (1,000 million debit card and 500 million e-purse payments) would save EUR 106 million annually. In this scenario, the number of debit card payments would roughly double, while the number of e-purse payments would increase fivefold compared to 2003. In a recent study, the DNB (2006) builds on its earlier inquiry into the cost of payments, and presents a number of more elaborate simulations - which I will not discuss here. However, the DNB confirms that in the trade-off between seigniorage and efficiency, it clearly opts for the latter. And what is particularly striking is that it is presented, almost laconically, as a self-evident choice: "DNB's objective being, as said, the promotion of smooth payments, *the [...] effect on seigniorage does not come into play for DNB*" (o.c., p. 66; my emphasis).

Against this background, it is interesting to point out that the conclusion that the National Bank of Belgium draws from its cost figures and corresponding simulations is considerably more conservative than that of its Dutch counterpart. As can be seen in figure 1, the social cost estimates for Belgium are by and large comparable to those for the Netherlands. The NBB has also computed the potential cost savings in a similar scenario (in which the number of debit card payments would rise equally strongly but the number of e-purse payments only half as much). However, the NBB comes up with a figure of EUR 58 million and stresses above all that the cost savings are thus actually 'relatively modest' because they only amount to 0.02% of GDP (as is incidentally also the case in the Netherlands)¹⁴. The NBB thus seems to take a different position along the seigniorage-efficiency trade-off. To complete the picture, according to Anton Schautzer of the Oesterreichische Nationalbank:

"The ECB maintains a *neutral* position with regard to the various payment media, leaving it up to the consumers to decide which ones to use" (SCHAUTZER, 2007, p. 149; emphasis added).

Now that the basic dilemma facing central banks with regard to POS payments has been explained, the following sections look at how this trade-off might impact their position concerning more concrete public policy actions, such as - to start with - a possible attempt to promote cost-based

¹⁴ As an aside, note that the DNB and NBB scenarios mentioned here only take into account the impact on the variable costs. To the extent that the fixed costs are also affected, the total cost savings will be larger; see also DNB (2006).

pricing. There are obviously other ways to make cash less attractive, such as restricting the number of ATMs (DNB, 2006; JONKER & KETTENIS, 2007), increasing the number of POS terminals¹⁵, or lowering the acceptance of cash¹⁶. However, this article focuses on actions in which central banks could take the lead.

■ Central banks and cost-based pricing

I have been arguing in favour of cost-based pricing of payment instruments for quite some time now; see VAN HOVE (2002, 2004). The essence of my stance on this issue is as follows. If consumers do not face direct charges when deciding which payment instrument to use at the POS, the result will be overuse of inefficient payment instruments that are costly to society. And, crucially, all consumers end up footing the bill, even those who do try to pay in the most efficient way. Hence, there should be explicit fees; the fees should be in part per-transaction (since flat fees per year, for example, result in a marginal cost of zero, and hence provide no incentive to optimise one's payment behaviour)¹⁷; and, finally, the fees should give information on the relative social costs of the payment instruments (in other words: they should be cost-based). To be clear, cost-based does not necessarily mean 'price equal to cost'. However, for the policy to work, it is essential that the 'efficiency hierarchy' of payment instruments is respected, and that payment instruments that are more costly to society are also more costly for consumers.

¹⁵ In the Netherlands, a recent survey by TNS Nipo revealed that more than one-third of Dutch merchants - in particular small merchants - still only accept cash (MOB, 2007, p. 23). The telecom costs associated with accepting debit card payments are part of the explanation. The Stichting Bevorderen Efficiënt Betalen - translated literally: Foundation for the Promotion of Efficiency in Payments - has therefore started offering reasonably priced combi packages that include a payment terminal and a telecom contract. It even gives a subsidy of EUR 100 to the first 10,000 merchants. The Stichting was created as a result of the 'Payment Services Covenant 2005' (Convenant Betalingsverkeer 2005), an agreement between banks and retailers to promote the efficiency of the Dutch payment system. The banks have put EUR 10 million in the fund managed by the Stichting; see: <http://www.efficientbetalen.nl/sbebover.html>.

¹⁶ Interestingly, in the Netherlands a number of supermarkets, such as Albert Heijn, are experimenting with card-only checkout lanes (MOB, 2007, p. 23).

¹⁷ Theoretically, the best solution is a two-part tariff, with the flat fee - say, an annual fee per year - covering the fixed costs, and the per-transaction charges covering the variable costs.

Crucially, the central bank studies discussed in the previous section clearly show that, for most transaction amounts, cash is more costly than debit cards or e-purses. Under cost-based pricing, cash should thus be more expensive to use for consumers than either payment card¹⁸. In reality, this is not the case in most countries. In Belgium, for example, following a gentlemen's agreement between the commercial banks and the Minister of Consumer Affairs, consumers are entitled to 24 ATM cash withdrawals per year free of charge¹⁹. Sweden is another example²⁰. In order to give consumers a financial incentive to economise on the use of the payment instrument that is most costly for society, cash should thus be made more expensive. Obviously, a per-transaction charge at the POS would be pretty cumbersome²¹. A more realistic option would simply be to introduce, c.q.

¹⁸ To be clear, in a country where cheques are still inexpensive for consumers, cost-based pricing should also apply to cheques. Otherwise, people could shift back to cheque payment once ATM use is made more expensive.

¹⁹ The origin of this gentlemen's agreement shows that government officials do not always understand how best to serve consumer interests. In November 2003, Fortis - one of the 4 big banks in Belgium - announced its intention to start charging EUR 0.06 for cash withdrawals at its 'private' self-banking terminals (i.e., terminals that were not part of the joint Banksys ATM network). In so doing, Fortis would have become the first Belgian bank to introduce charges for the use of its self-banking terminals, and, in this way, also the first to charge for all access channels to cash (Belgian banks had already introduced charges for cash withdrawals at the counter and via the Banksys ATMs). However, the announcement of the charges caused a public outcry. In December 2003, Minister of Consumer Affairs Freya Van den Bossche jumped on the affair and started putting pressure on Fortis to revise its decision by threatening to issue a law that would regulate pricing of cash withdrawals. In February 2004, the banks signed a gentlemen's agreement to keep a 'reasonable number' of cash withdrawals free of charge, and in May 2004 this number was fixed at 24 (the average number of cash withdrawals per year at the time). The intervention by the Minister of Consumer Affairs thus effectively turned back the clock concerning the pricing of cash. This may seem beneficial for consumers, but it is not: the higher social costs of inefficient cash usage are ultimately borne by consumers anyhow (via higher prices in shops, lower interest rates on savings accounts, etc). The only difference is that the costs were again hidden to a larger extent.

²⁰ In a study of the price and cost structure of retail payment services in Sweden, GUIBOURG & SEGENDORF (2004) show that variable costs are poorly reflected in fees, especially where private customers are concerned. For example, cardholders pay no transaction fees whatsoever for cash withdrawals; cf. also the speech by Stefan Ingves, governor of the Sveriges Riksbank, quoted below. GUIBOURG & SEGENDORF (2004, p. 15) therefore conclude that "almost no information about [...] relative costs for close substitutes is passed on to consumers through the price mechanism. Especially in the case of consumers, relative prices convey no information at all".

²¹ Note that Article 40 of the Payment Services Directive explicitly allows for surcharging by the payee: "1. Where, for the use of a given payment instrument, the payee requests a charge or offers a reduction, the payee shall inform the payer thereof prior to the initiation of the payment transaction."

increase fees for cash withdrawals at all bank channels, and to make use of *ad valorem* fees. Otherwise, consumers could partly circumvent them by making fewer withdrawals, but for bigger amounts ²².

In a recent study, DE GRAUWE *et al.* (2006) show that the impact of the introduction of cost-based pricing would be sizeable. DE GRAUWE *et al.* first use panel data for 25 European countries over the period 1998-2003 to estimate a discrete choice model that explains the market shares of debit cards and cash. An important finding of this econometric analysis is that consumers appear to react in a significant way to changes in the cost of cash and cards. In other words, an increase in the price of cash (as paid by consumers) leads to a significant decline in its usage. DE GRAUWE *et al.* then use the estimated price elasticities to simulate the impact of the introduction of cost-based pricing for both cash and cards. For the sake of simplicity, they interpret this as meaning 'price equal to cost', although the authors are quick to point out that this is by no means a necessity for such a policy to work; cf. also *supra*.

DE GRAUWE *et al.* find that the effects are quite large. In a panel of 19 European countries, the market share of cash (in volume) would decrease from 96% to 81%, and debit cards would jump from 4% to 19%. In value terms, the market share of cash would decrease from 78% to 38%, and debit cards would go from 22% to 62%. They also use their estimates to analyse how the switch to cost-based pricing would affect resource costs. Due to a lack of data on the latter costs, they can reliably make this analysis for Belgium and the Netherlands only ²³. DE GRAUWE *et al.* find that the introduction of cost-based pricing would lead to a reduction of resource costs of more than EUR 200 million in Belgium and about EUR 150 million in the Netherlands. Putting these numbers into perspective, for Belgium these cost

2. Where, for the use of a given payment instrument, a payment service provider or a third party requests a charge, he shall inform the payment service user thereof prior to the initiation of the payment transaction".

²² One could argue that social exclusion is a potential danger of cost-based pricing. However, in my view, social exclusion is a problem that will have to be tackled in the near future anyhow because in many countries the ability to pay with notes and coins is increasingly curtailed, in part also because many services are moving to the internet. As a result, sections of society might get locked in the 'cash economy'. There are several ways in which governments could try to stave off this danger. In Belgium, for example, a law that entered into force on September 1st, 2003, made it mandatory for banks to provide everyone with a 'basic' current account, and this for maximum EUR 12. One might envisage that such basic accounts come with a payment card.

²³ For the Netherlands they use the study by the DNB and for Belgium they rely on an earlier study – DE GRAUWE *et al.* (1999), with estimates for 1998 – rather than on the more recent study by the NBB (2005).

savings correspond to 12% of the current resource costs of cash and debit cards together. The corresponding figure for the Netherlands is 6%²⁴. The authors stress that these cost savings should be seen as 'static' gains; i.e., they do not take into account the impact of economies of scale within the card payment system.

Returning to our analysis of central bank dilemmas, the bottom line of the above is that the introduction of cost-based pricing would lower the market share of cash. One could thus fear that central banks would oppose such a move. However, the Norwegian central bank, for one, has long been in favour of it (and has also acted upon it):

"Norges Bank has traditionally promoted the principles that the party that chooses the payment service should also pay for it, and that services that are costly to produce should be priced higher than services that are less expensive to produce" (ENGE & ØWRE, 2006, p. 170).

Moreover, compared to my earlier account of the state of the debate on cost-based pricing in VAN HOVE (2004), in recent years an increasing number of economists from other central banks have also spoken out in favour of it. In a recent presentation, Harry Leinonen of the Bank of Finland, for example, emphasised that "customer tariff incentives facilitate change" and that "cash needs to be priced and not subsidised" (LEINONEN, 2006). He also referred to the Finnish experience with private cheques, which "were replaced by debit cards in 3-4 years when cheque forms were priced at about EUR 0.10." Wilko Bolt of De Nederlandsche Bank also talks about "inefficient cross-subsidization of payment services" (BOLT, 2006, p. 355)²⁵.

A number of central banks in Asia also seem convinced. Pariwat and Hataiseree of the Bank of Thailand point out that the relatively high level of cash usage in Thailand has "important implications for the BOT in its attempt to further enhance the level of efficiency in retail payments by encouraging

²⁴ In a crude calculation, DE GRAUWE *et al.* also extrapolate this analysis to their sample of 19 European countries by assuming that the cost structure of the payment systems in these countries is similar to Belgium and the Netherlands. In this way, they estimate the possible savings from the implementation of cost-based pricing as amounting to 0.14% of GDP, on average – which, they point out, "is not a negligible amount" (*o.c.*, p. 37). To put these numbers into perspective, they estimate the current total resource costs of cash and cards in the sample of 19 countries to be equal to 1.22% of GDP.

²⁵ Bolt is correct in pointing out that the strong network externalities that are typical for payment networks make pricing arrangements for payment instruments a complex matter.

the greater use of electronics-means (sic) of payments, especially those of debit/credit cards, e-money, e-purse, in retail transactions" (PARIWAT & HATAISEREE, 2004, p. 54). As a solution, they propose:

"that the rate of growth for the cash usage needs to be limited at some particular levels deemed to be relevant to the state and degree of development of the Thai economy as the whole. More specifically, it should be maintained at the level not greater than 9% of GDP for the years 2004-2006. Such the target level (sic) needs to be gradually reduced to the level not greater than 8.5% of GDP for the years 2007-2009".

PARIWAT & HATAISEREE also point out that the Bank of Thailand tries "to foster the use of cost-based pricing for payment services" (p. 54). The most recent example that I have come across relates to Malaysia. In its *Financial Stability and Payment Systems Report 2006*, Bank Negara Malaysia mentions that it has "initiated a payment cost study with several banks to better understand the cost of producing different payment methods and the pricing mechanism adopted" (Bank Negara Malaysia, 2007, p. 77). Interestingly, "The study is to facilitate the proposal to move towards a direct-pricing framework that relates to the cost of producing the different payment methods as well as transparency in pricing" (p. 78) ²⁶.

Perhaps even more encouraging is the observation that in the EU, not only economists in research departments of central banks support cost-based pricing, but that even Gertrude Tumpel-Gugerell, the member of the Executive Board of the ECB responsible for Payment Systems and Market Infrastructure, has made public comments in that direction:

"I would expect banks to apply pricing methods that better reflect the efficiency of the respective instrument. Consumers may choose inefficient payment instruments, but they should pay the true price of the instruments and banks should not subsidise inefficient payment instruments by making efficient instruments more expensive. In Scandinavian countries, studies have revealed that cost-based pricing

²⁶ The report also refers explicitly to the Scandinavian examples: "Learning from the experiences of Norway and Sweden, transparent and cost-based pricing is a powerful tool to foster the migration of users to electronic payments, which are less costly to produce and provide the opportunity to reap economies of scale. As users' choice is sensitive to price, by giving the right price signals to users, they would be able to see the economic incentives and switch from the more expensive payment methods to cheaper alternatives. This would, in turn, encourage investment in and the offering of more cost efficient payment services, thereby resulting in cost savings and efficiency gains for the nation as a whole" (p. 78).

also leads consumers to change their payment habits in favour of efficient instruments." ²⁷

Talking about Scandinavia, the Governor of the Swedish central bank, Stefan Ingves, has also expressed support for cost-based pricing:

"[...], it is interesting to reflect on why we Swedes prefer to pay by cash rather than by card more often than our Nordic neighbours. The number of card transactions per inhabitant in 2003 was around 130 in Norway, just over 100 in Finland and Denmark and just over 80 in Sweden. There is no clear explanation for this, but one clue may lie in pricing. In Sweden, cash withdrawals from all ATMs are free of charge, despite the large costs entailed in cash handling. In the other Nordic countries, cash withdrawals are only free of charge from the customer's own bank's ATMs, which has led to a reduction in the use of cash. Riksbank's opinion is that to achieve the best possible efficiency with regard to payments, the respective means of payment should bear its own costs and those who make the payments should be aware of these costs in order to make rational choices." ²⁸

To complete my overview of positions on cost-based pricing, let me mention that the European Commission is also convinced of its benefits. The

²⁷ Source: TUMPEL-GUGERELL G., "The need for regulatory involvement in the evolution of payment systems", speech at the International Payments Conference 2005, London, April 25th, 2005 <<http://www.ecb.int/press/key/date/2005/html/sp050425.en.html>>.

²⁸ Source: INGVES S., "Cash management - an important social issue", speech to the first meeting of the cash management advisory board, Sveriges Riksbank, Stockholm, April 26th, 2006 <<http://www.riksbank.com/templates/Page.aspx?id=21250>>. In a 2005 speech, his Deputy Governor, Lars Nyberg, was even more explicit: "In order to achieve a more efficient payment system the prices for payment services should be based on production costs, including not only costs in the producing unit but also the end users' and the intermediaries' costs [in other words, social costs; lvh]. Other things equal, transparent and cost-reflecting prices give users the information they need to choose the payment instruments that cost less to produce." And also: "A more cost-based price strategy would result in private customers facing transaction fees on paper-based and electronically-initiated credit transfers and in the introduction of transaction fees for cash withdrawals. [...] The fact that Swedish banks do not take any fees whatsoever for cash withdrawals, while such fees can be observed in the other Nordic countries, may very well be the explanation for our greater use of cash and lesser use of card payments" (Source: Nyberg, L., Prices and costs in the Swedish payment market, speech, Scandinavian Card Markets, Sheraton Hotel, Stockholm, January 25th, 2005. <<http://www.riksbank.com/templates/Page.aspx?id=15507>>. Note that in its 2002 reform of the local credit and debit card systems, the Reserve Bank of Australia was also clearly guided by the 'user pays' principle; see MacFARLANE I.J., "Gresham's law of payments", talk to Australasian Institute of Banking and Finance Industry Forum 2005, Sydney, March 23rd, 2005 <http://www.rba.gov.au/Speeches/2005/sp_gov_230305.html> and LOWE P., "The Evolution and Regulation of the Payments System", Address to Payments System Conference 2006, Melbourne Business School, Melbourne, March 14th, 2006. <http://www.rba.gov.au/Speeches/2006/sp_ag_140306.html>. Macfarlane is Governor and Lowe is Assistant Governor (Financial System) of the RBA.

following quote is taken from the Commission's impact analysis of the Payment Services Directive that was recently approved by European Parliament:

"The overall social cost of using payment services could be reduced if consumers and business selected the means of payments in a more rational way. When prices paid by users reflect the real cost value of the service, they provide an incentive for users to select services that meet their needs at the lowest possible private and social cost. This promotes the efficiency of the payment system. It is well documented in studies that cost-based pricing of payment services triggers customer behaviour and the right price signals can drive customers to select more efficient payment services rather than less efficient ones." ²⁹

Finally, and less surprisingly, it can be noted that the minds of bankers are also ripe for change. In a recent issue of the trade publication *European Card Review*, Ragnar Onundarson, CEO of Kreditkort, formerly Europay Iceland, is quoted as saying: "A fee on cash has not yet been applied, but it's time to do so. In reality, banks are subsidizing the competing substitute" ³⁰. The push for a cash fee may seem surprising, as cash use in Iceland is already down to around 1% of GDP ³¹. But the reasoning is that in order to pursue the goal of creating the world's first cashless society, banks in Iceland may have to consider additional measures. Moreover, because of the high fixed costs involved, there is also the problem that as the number of cash transactions drops, the average cost of a cash transaction increases substantially, especially in a country that has limited scale to start with. DE GRAUWE *et al.* (1999) estimate the average social cost of a cash transaction at BEF 23 (EUR 0.56) in Belgium vs. no less than BEF 125 (EUR 3.10) in Iceland - or a factor of 5.5 higher ³².

²⁹ Source: Commission of the European Communities, Impact assessment - Annex to the proposal for a Directive of the European Parliament and of the Council on payment services in the internal market, Commission Staff Working Document, Sec(2005) 1535, December 1st, 2005 <http://ec.europa.eu/governance/impact/docs/ia_2005/sec_2005_1535_en.pdf>, p. 65. A similar statement can be found on p. 79.

³⁰ Source: ROLFE R., "Wonder of the world" – Country report on Iceland, *European Card Review*, Vol. 14, no. 1, January/February 2007, p. 18.

³¹ Compare with the figures reported in footnote 9.

³² The estimates relate to 1998 and 1997, respectively.

■ Central banks, counterfeiting, and anonymity

As already mentioned, if and when central banks promote cost-based pricing, then this is clearly done with the explicit purpose of promoting electronic alternatives. However, there are also central bank decisions that are primarily taken with other goals in mind - such as fighting counterfeiting and money laundering - but that nevertheless influence the relative attractiveness of cash versus payment cards. This section and the next analyse two such decisions.

One of the great benefits of cash is its anonymity and untraceability. However, the downside is that it is precisely these features that make cash so popular in the underground and criminal economy. Looking at this issue against the backdrop of the dual role of central banks, it is interesting to point out that central banks have always insisted that e-purses be accounted (i.e., have so-called 'shadow accounts'), thus safeguarding the relative advantage of their own product - or at least that is what one could argue. Indeed, central banks have had reservations about allowing person-to-person transfers with e-purses from the start (Working Group on EU Payment Systems, 1994, p. 8; PERDRIX, 1994, pp. 95-96; BIS, 1996, p. 6)³³. Tellingly, when Crédit Mutuel wanted to test the (unaccounted) Mondex card in the French city of Strasbourg, it had to restrict purse-to-purse transfers to within families to comply with Banque de France requirements (ANDRIES, 1999, p. 89-90)³⁴. DREHMANN *et al.* (2002) argue that it is simply implausible to envisage authorities allowing a completely anonymous e-money system. A recent article in *The Economist* that speculates on the demise of cash also goes into this issue:

"[...], anonymity can be a cloak for wrongdoing. The suspicion clings that where you find anonymity you find drugs, fraud, money laundering, terrorist financing and a huge amount of humdrum tax evasion. No wonder governments have long sought to control anonymous financial instruments. The state is almost certain to limit the amount that can pass through an anonymous card or phone. Eager to collect taxes from builders and nannies, it will also be tempted to monitor electronic-cash payments". ("The end of the cash era", *The Economist*, February 17th, 2007, p. 11).

³³ The reason given for this is that the resulting 'open circulation' would increase the risk of someone introducing forged money into the system without being detected soon enough.

³⁴ See also: ADAMS J. & R. ROLFE, "Can French banks make e-purse pay?" *European Card Review*, Vol. 7, no. 1, January/February 2000, pp. 12-16.

Interestingly, *The Economist* adds: "Whether it does so is a political question, not a technological one", and particularly: "The more the state intrudes into electronic cash, the more it encourages inefficient notes and coin".

In defense of central banks, it should be pointed out that until recently it was basically technically impossible to alter the position of banknotes along the traceability-untraceability continuum. However, today it is possible to embed radio frequency identification (RFID) tags the size of a grain of sand into the very fibers of banknotes, although reportedly perhaps not yet in a cost-effective way³⁵. In theory, such 'spy chips' would give governments and law enforcement agencies a means to literally 'follow the money'. With simple versions of the tags, data can only be written on the chip's ROM during production, and not after the banknote is out 'in the wild'. Nevertheless, whenever a banknote passes through reader equipment, the tag could wirelessly transmit a serial number, as well as details such as place of origin and denomination. As a result, routine bank processes such as counting could be speeded up tremendously: a stack of notes can be passed through a reader with the sum added up in a split-second. Also, the circulation of a banknote could be mapped, and this in more or less detail depending on the number of readers. The functionalities of a (more expensive) tag with writable memory are even more fascinating. It could make it very difficult, for example, for kidnappers to ask for 'unmarked' bills. Indeed, as Paul Saffo, director of Institute for the Future (Menlo Park, Calif.), is quoted in a 2001 article, "The RFID allows money to carry its own history"³⁶.

Interestingly, there is a continuing rumour that the European Central Bank is considering adding RFID tags to its banknotes. The rumour dates back to 2001, when the *EE Times* first reported about it as a "hush-hush project"³⁷. At the time, a spokesman for the ECB "confirmed the existence of a project, but was careful not to comment on its technologies"³⁸. According to the article, the goal was mainly to foil counterfeiters: "the ECB believes it must add further protection to keep the Euro from becoming the

³⁵ Source: MURRAY C.J., "RFID tags: driving toward 5 cents", *Electronics Design, Strategy, News*, June 8th, 2006, pp. 69-73 <<http://www.edn.com/contents/images/6339247.pdf>>.

³⁶ Source: YOSHIDA J., "Euro bank notes to embed RFID chips by 2005", *EE Times*, December 19th, 2001 <<http://www.eetimes.com/story/OEG20011219S0016>>.

³⁷ O.c.

³⁸ O.c.

currency of choice in the criminal underworld, where the U.S. dollar is now the world's most counterfeited currency." The article also added that it was unclear whether the ECB would incorporate RFID chips into all Euro banknotes or just on the larger bills, because: "the EUR 200 and EUR 500 bank notes in particular [...] are expected to be popular in the 'informal' economy" ³⁹. The rumour reemerged in 2003 when Hitachi leaked to a news agency that it had signed a deal with the ECB ⁴⁰. A 2006 article in a trade publication quotes an ECB spokesperson as saying: "We cannot say anything about this, and we've requested that our providers sign a mutual agreement not to talk about it" ⁴¹. In the same article, Hitachi denies it has worked on an RFID project for the ECB. Finally, SCHAUTZER (2007, p. 148) mentions that the launch of the second series of Euro banknotes is scheduled for the beginning of the next decade. He does not, however, provide details as to the security features of the new series.

Should the ECB eventually weave RFID into the fabric of its banknotes, this would obviously thwart their popularity, and that of the larger banknotes in particular, as explained in the next section. To conclude, it is worth pointing out that one could raise questions as to the optimal extent to which central banks should fight counterfeiting. When introducing her paper on detection devices at the DNB Research Conference in November last year (JONKER *et al.*, 2006), Nicole Jonker of DNB pointed out that the increased interest of DNB in counterfeiting was due to the fact that in 2003-2004 several Dutch merchants had stopped accepting banknotes of EUR 100 because of increased counterfeiting ⁴². Somewhat cynically, one could argue that from an efficiency point of view this was actually a beneficial development - if it resulted in increased use of debit cards, that is. Indeed, figure 1 shows that in the Netherlands the use of cash should be discouraged for payments above EUR 11.63, and it seems reasonable to assume that the majority of EUR 100 notes were presented at the POS with the intention of making a payment in this region. Hence, one could argue

³⁹ *O.c.*

⁴⁰ Source: CHAI W., "Euro notes may be radio tagged", *CNet Asia*, May 22, 2003 <<http://www.zdnet.co.uk/misc/email/0,100002098,2135074-39001084c,00.htm>>.

⁴¹ Source: MURRAY C.J., "RFID tags: driving toward 5 cents", *Electronics Design, Strategy, News*, June 8th, 2006, p. 72 <<http://www.edn.com/contents/images/6339247.pdf>>.

⁴² See, for example, "Winkeliers gaan biljetten van 100 euro weigeren (Merchants intend to refuse EUR 100 notes), *De Telegraaf*, May 2nd, 2004. The same phenomenon also occurred in Belgium; see "Handelaars weigeren groot geld (Merchants refuse big banknotes)", *De Standaard*, March 8th, 2004.

that central banks should allow some counterfeiting - on condition that confidence in the currency is not completely undermined.

■ The denominational structure of a banknote series

A final example of the tension between a central bank's private and public roles in the provision of payment instruments is related to the denominational structure of a banknote series. The literature on this topic argues that in choosing the denominations of coins and banknotes, a central bank should primarily bear in mind the so-called principle of least effort, which says that the settlement of cash transactions should, on average, involve as few tokens - coins and/or banknotes - as possible (VAN HOVE, 2001). This will, so the argument goes, improve convenience for transactors, speed up transactions, and curb the bulk and weight carried about by the cash-using public. Following this principle of least effort, if the ECB would want to discourage cash payments of, say, EUR 500 - as it clearly should according to the social cost figures presented in figure 1 - then it should withdraw from circulation the EUR 500 banknote, and maybe also the EUR 200 banknote. By doing this, cash users would be forced to use five 100 Euro notes instead of a single 500 Euro note. However - and here the schizophrenia emerges again - from a business perspective, it makes perfect sense for a central bank to issue EUR 500 banknotes since a banknote of EUR 500 replaces five banknotes of EUR 100. In other words, printing costs are trimmed down to one-fifth. However, maximising profits from the issuance of currency is not the objective of a central bank⁴³. and it should not, therefore, base its policy on cost considerations.

Moreover, there is another, even more imperative reason why the ECB should seriously consider withdrawing high-denomination banknotes. Intriguingly, in March 2007, the EUR 500 banknote - which is basically impossible to use in everyday transactions - accounted for no less than

⁴³ Cf. what Peter Ledingham (1994, p. 347; italics added) of the Reserve Bank of New Zealand writes about this: "[...] Reserve Bank provision of currency under a statutory monopoly is seen as a useful public service, and one which provides a basis on which other payment arrangements and contracts must ultimately rest. But *it is not thought to be an area where the Reserve Bank should seek to maximise its income. Rather the Bank's role is to facilitate and encourage overall payment system efficiency [...]*".

34.5% of the total value of euro banknotes in circulation⁴⁴. The share of EUR 200 and EUR 100 banknotes was 4.9% and 17.9%, respectively. This is also a point emphasised by JONKER & KETTENIS (2007). Jonker and Kettenis break down Euro banknote circulation by the way the denominations are used by the public, and argue that the banknotes of EUR 5-EUR 20 can be considered to be 'transaction denominations' (in that they are primarily used for effecting payments), whereas the banknotes of EUR 100-EUR 500 are mostly used for hoarding (*o.c.*, p. 12). Finally, the EUR 50 note is, in their view, used for both transactions and hoarding. By assuming that half the number of EUR 50 banknotes in circulation is used for transactions, Jonker and Kettenis compute that the 'hoarding banknotes' make up roughly 70% of the total value of Euro banknotes in circulation (p. 12-13). The bottom line here is that the bulk of the demand for Euro banknotes has nothing to do with transactions in the Euro zone above-ground economy⁴⁵. The ECB itself recognises that "the circulation [of the Euro] has shifted towards the higher-value denominations" and that this is mainly "due to the ongoing hoarding and the increasing international role of the Euro" (ECB, 2004, p. 79). However, the ECB stops short of acknowledging that the underground and criminal economies - both within and outside the eurozone - play a large role in this. In my view, the latter poses a serious moral dilemma for the ECB: it is rather questionable - to say the least - whether a central bank should provide the means for purposes such as tax evasion, let alone money laundering and outright criminal activities⁴⁶.

It is for this reason that HUMPHREY *et al.* (2000, p. 12) launch the following proposal:

"[In the future] governments may find it feasible to withdraw over time all but coins from circulation in order to reduce the incidence of underreported sales tax and business cash income as consumers

⁴⁴ Source: ECB, Latest figures on euro banknotes and coins, webpage, s.a. <<http://www.ecb.int/bc/faqbc/figures/html/index.en.html>>, visited on May 13th, 2007.

⁴⁵ Note that this implies that a switch to cost-based pricing would not dramatically affect the level of seigniorage. Indeed, there is little doubt that the benefits from tax evasion outweigh whatever fees for cash withdrawals would be introduced. Moreover, banknotes circulating abroad and/or outside the bank sector would not be affected by the fees. Hence, other measures will be needed to drive out high-denomination banknotes; cf. *infra*.

⁴⁶ Cf. Working Group on EU Payment Systems (1994, p. 10): "A negative aspect of the large-scale use of electronic purses, in combination with the widespread use of debit and credit cards, might be that, in the long run, the use of banknotes could be limited mainly to transactions in the underground economy, for which purposes central banks may wish to avoid providing the means" (*italics added*). See also BUITER (2005, p. C23).

continue to shift to card and electronic purse payment methods. [...] Paired with enhanced sales and income tax enforcement, such a policy would likely raise tax revenues by more than the decrease in seigniorage."⁴⁷

Rogoff also argues that governments may well be penny-wise and pound-foolish in trying to ensure the popularity of their currencies at all costs:

"If cash facilitates illegal activities and tax evasion, it might, in theory, generate expenses and tax losses that could significantly offset any seigniorage revenues ..."⁴⁸

VAN HOVE & VUCHELEN (1996) have already argued that by proposing to issue banknotes as large as EUR 500, the European Monetary Institute (the precursor of the ECB) seemed to serve its self-interest more than the public interest, and that the future European Central Bank would in fact be catering primarily to the needs of the underground economy. The authors therefore proposed restricting the nominal value of the largest Euro banknote to EUR 50 instead of EUR 500. I would like to repeat that proposal here⁴⁹. Over ten years later, there is even less reason to fear that the

⁴⁷ This statement has been toned down somewhat in the published version: "In the future, should all but the smallest denomination currency be withdrawn from circulation as legal use of cash continues to contract? Should all currency be withdrawn and coins (a cost-effective substitute for notes due to their long lifetimes) be substituted for the smallest value currency?" (HUMPHREY *et al.*, 2004, p. 232).

⁴⁸ Source: ROGOFF K.S., "The surprising popularity of paper currency", *Finance & Development*, Vol. 39, no. 1, March 2002
<<http://www.imf.org/external/pubs/ft/fandd/2002/03/rogoff.htm>>.

As GUIBOURG & SEGENDORF (2007, p. 14) point out, seigniorage may be viewed as an implicit tax on the underground economy. But this is clearly a second-best solution at the most (VAN HOVE & VUCHELEN, 1996). For the case of Sweden, GUIBOURG & SEGENDORF estimate this tax to be some SEK 1 billion in 2004, and acknowledge that it is "low" (2007, p. 14).

⁴⁹ Antti Heinonen, head of the ECB's bank notes directorate, is obviously correct in making the following statement: "Clearly cash is used by criminals because it is an anonymous instrument. But to say that it would be more difficult to commit a crime if we didn't have high denomination notes would be to confuse cause and effect. If we didn't have the higher denominations, criminals would use the lower denominations - or other global currencies, such as the US dollar or Swiss franc" (Source: "A coming of age for the European currency", *Financial Times*, December 28th, 2006, p. 2). However, one should be aware of the implicit political trade-off that is made here. The price for making life more difficult for those active in the underground economy would indeed be a loss of seigniorage for the ECB (in case of a switch to other currencies) and/or an increase in production costs (in case of a switch to lower-denomination banknotes). But it would seem to me that a central bank has a moral obligation to at least try to combat the underground economy. Interestingly, in a situation with cost-based pricing of cash (see above), the resulting increase in printing and other costs would be less of a problem, as the costs would only be borne by the users of cash, and not by society at large.

above-ground economy would not be able to survive with such a banknote series. As a matter of fact, in a country like Belgium, many consumers hardly ever have banknotes larger than EUR 20 or EUR 50 in their wallet, for the very simple reason that ATMs - the channel of choice for obtaining cash - do not carry larger banknotes.

To conclude this section, the maxim that the use of cash should be discouraged also sheds a different light on other decisions concerning the series of coins and banknotes issued by a central bank. For example, in 2002-2004, the ECB considered the idea of introducing banknotes of EUR 1 and EUR 2. Several Euro zone states supported the plan, arguing it might help curb price rises⁵⁰. There are also indications that people found the number of Euro coins (8 in total) too high, and the metallic form of the EUR 1 and EUR 2 denominations in particular unwieldy⁵¹. As discussed in VAN HOVE (2006), quite a few of the European e-purses enjoyed a 'Euro-bounce' following the launch of the common currency. In Belgium, for example, the number of active Proton cards increased by some 700,000 units (equivalent to roughly 7% of the Belgian population) between December 2001 and January 2002. However, this 'Euro effect' gradually disappeared as consumers became more familiar with the new Euro coins. The lesson here appears to be that if the use of cash is to be discouraged, central banks should opt for high-denomination coins rather than low-denomination banknotes. In other words, the ECB's 1998 decision to introduce EUR 1 and EUR 2 coins was just the thing to do, and, hence, it should not be revised. Reasoning strictly from an efficiency point of view, the more inconvenient consumers find Euro cash, the better. Ultimately, the Governing Council of the ECB decided in November 2004 not to issue low-denomination banknotes (European Central Bank, *Annual Report 2004*, p. 98). The same logic can also be applied to the possible removal from circulation of the EUR 0.01 and EUR 0.02 coins⁵². If consumers find them inconvenient, then they

⁵⁰ Source: "ECB may issue one euro note to curb price rises", *Financial Times*, December 12th, 2002.

⁵¹ In November 2002, a little less than one year after the introduction of the physical Euro, 41% of Euro zone citizens believed the range of available coins was too large (Source: EOS Gallup Europe, "The Euro, one year later", *Flash Eurobarometer*, European Commission, no. 139, November 2002 <http://ec.europa.eu/public_opinion/flash/fl139_en.pdf>). In view of what follows in the main text, it is interesting to point out that the figure for Belgium was considerably higher, namely 57%.

⁵² In September 2004, Belgian Minister of Finance, Didier Reynders, proposed halting the production of the EUR 0.01 EUR 0.02 coins in Belgium, and removing them gradually from circulation (Source: "Discounters tegen afschaffen kleinste munten", *De Morgen*, September 2nd, 2004).

should by all means left in circulation in order to not to lower the relative attractiveness of e-purses (and debit cards) ⁵³.

■ Concluding remarks

On a general level, this article argues that in the market for retail payment instruments, central banks find themselves in a schizophrenic position - a position which, in the past, they have not always been keen to discuss. For example, in 2003 the Committee on Payment and Settlement Systems released a report entitled 'Policy issues for central banks in retail payments' (CPSS, 2003) ⁵⁴. Implausibly, the report stated that it "did not concern itself with any policy issues arising from the use of cash" (p. 6). Clearly, the competitive position of any given payment instrument cannot be considered independently from the position of other payment instruments in the same market.

On a more concrete level, this article looks at a number of policy issues related to retail payment instruments, namely: pricing strategies, the optimal level of traceability of physical versus electronic cash, and the choice of denominations of coins and banknotes. It argues that analysing these problems against the backdrop of the dual role of central banks can result in a different view of the matter.

Of all the possible measures discussed, the introduction of cost-based pricing would probably have the biggest impact on the relative attractiveness of cash at the POS, and hence on the efficiency of our payment systems. It is therefore encouraging to observe that an increasing number of central bankers as well as the European Commission have in recent years spoken

⁵³ In November 2002, a large majority of Euro zone citizens were in favour of getting rid of EUR 0.01 (63%) and EUR 0.02 (57%) coins (Source: EOS Gallup Europe, "The Euro, one year later", *Flash Eurobarometer*, European Commission, no. 139, November 2002 <http://ec.europa.eu/public_opinion/flash/fl139_en.pdf>). By October 2005, these figures had dropped slightly to 58% and 52%, respectively (Source: TNS Soffres/EOS Gallup Europe, "The Euro, 4 years after the introduction of the banknotes and coins", *Flash Eurobarometer*, European Commission, no. 175, November 2005 <http://ec.europa.eu/public_opinion/flash/fl175_en.pdf>). Note that I have refrained from using the 2006 figures mentioned in Eurobarometer no. 193 because they are not fully comparable to the older figures.

⁵⁴ The report was prepared by the Working Group on Retail Payment Systems, which consists of payment systems experts from the central banks of each of the G10 countries, the Reserve Bank of Australia and the European Central Bank.

out in favour of cost-based pricing. The future will tell whether they mean it or whether they are just paying lip service to the principle⁵⁵. This will prove crucial because I agree with three McKinsey consultants when they argue in a recent article that "governments and central banks must play a key role in making the war on cash possible"⁵⁶. Indeed, as is observed in VAN HOVE (2002, 2004), GUIBOURG & SEGENDORF (2004, p. 20) and ENGE & ØWRE (2006, pp. 162-163), when it comes to pricing, commercial banks find themselves in a prisoners' dilemma type of situation: all banks would gain from a shift to cost-based pricing, but no bank wants to be the first to make the move for fear of losing market share. The result is that banks are locked into the high-cost equilibrium - or should I say low-price equilibrium? And a coordinated move by several banks is basically not an option as it would be seen as collusive by antitrust authorities.

This paper therefore argues that policy makers should explicitly foster the use of cost-based pricing and in particular create a legal environment that makes it possible for banks to start using it. ENGE & ØWRE (2006) provide an interesting account of exactly how this was done in Norway. The problem is obviously that making cash more expensive is not going to win elections; nor will it earn central bankers or Eurocrats plaudits. Indeed, explaining cost-based pricing to consumers is not easy: the costs are very visible - on purpose - and the claimed benefits - lower prices at the POS, higher interest rates - much less so. The key question therefore is: who will have the political courage to sell cost-based pricing of retail payments - cash included - to the general public? In the meantime less brave policymakers could start by educating consumers and merchants about the real cost of cash.

⁵⁵ Note in this respect that European savings banks have criticised the recently approved text of the Payment Services Directive for undermining electronic payments at the expense of hard cash: "The Directive strengthens obligations and increases costs for providers of electronic payment services, whilst omitting cash - the most expensive means of payment for society as a whole - from its scope" (Source: "ESBG reacts to the approval of the Payment Services Directive", press release, April 27th 2007 <<http://www.esbg.eu/template/press.aspx?id=2184>>).

⁵⁶ Source: DE PLOEY W., DENECKER O. & M. VAN OOSTENDE, "Fighting cash not SEPA: how European banks can win with debit cards", *gtnews.com*, March 19th 2007. See: <<http://www.gtnews.com/article/6676.cfm>>. Concretely, De Ploey and his co-authors argue that "banks should work proactively with their governments toward SEPA - obtaining, as a quid pro quo, government support for a cashless society. Governments, in turn, should ensure that cash is properly priced to merchants and consumers. They should also develop informative public relations campaigns and incentives to wean consumers from cash, such as tax breaks for merchants who accept and use electronic payments and electronic payments options for government services" (my emphasis). Interestingly, De Ploey *et al.* also argue - and this goes to the heart of the dilemmas discussed in this article - that "governments often position cash as a public good - to be offered free by banks - thereby inhibiting an economic debate on cash versus other instruments."

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