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"The social and private costs of retail payment instruments in Europe" – A Review of the ECB study

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Executive Summary

In September 2012 the European Central Bank ('ECB') published the results of its study of the social and private costs of retail payment instruments in Europe. The study combines cost data from separate studies conducted by thirteen national central banks in the European System of Central Banks.

The headline findings are that in 2009 aggregate retail payment instrument costs amounted to almost 1% of GDP for the sample of participating countries. Cash had the lowest social cost per transaction on average, though in five of the thirteen participating countries the cost per transaction were lower for debit cards. Moreover, when measured in relation to the value rather than the number of transactions, card payments had lower social costs per euro of sale than cash payments over the whole sample.

These results clearly show that it is impossible to put a simple figure on what it costs to make a payment. Considerable care is therefore required when trying to use the results in any debate about the appropriate policy towards payment instruments.

The study highlights the enormous difficulties associated with a comprehensive and reliable collection of cost data for different payment system, in particular where the costs to retailers are concerned. The study also shows that average transaction sizes and the overall volume of payments handled by different payment systems have a big impact on costs and are therefore key in assessing the relative efficiency of payment instruments. However, the importance of such scale economies can only be properly captured when cost measures are broken down into costs that vary with the value of transactions and/or the number of transactions, and costs that vary with regard to neither of these two measures.

The study clearly acknowledges these difficulties and the results that are reported are more differentiated than the headline figures suggest. In particular, the authors try to highlight the effects of scale economies, but are not in a position fully to address the question where scale economies are strongest, and what implications this has for a comparison of relative efficiency.

For these reasons, the result of the ECB study need to be interpreted with caution. In particular, the headline results must not be used without further qualification in any debate about the relative efficiency of payment instruments. Whilst the inherent limitations of the analysis are often acknowledged in the main body of the text, they are not reflected in the presentation of headline results.

We believe that the main conclusions that can be drawn from the study are not the specific cost estimates but a recognition of the enormous difficulties of measuring the cost of payment systems robustly and reliably, and the importance to account properly for scale economies.

1 Introduction

1. In September 2012 the European Central Bank ('ECB') published the results of its study of the social and private costs of retail payment instruments in Europe. The study combines private and social cost data from separate studies conducted by thirteen national central banks in the European System of Central Banks (ESCB) in accordance with a common framework.[1]

2. The authors find that in 2009 aggregate retail payment instrument costs amounted to almost 1% of GDP for the sample of participating countries.[2] Cash had the lowest social cost per transaction on average. However, in five of the thirteen participating countries debit cards had lower costs per transaction than cash. Moreover, when measured in relation to the value rather than the number of transactions, card payments had lower social costs per euro of sale than cash payments on average over the whole sample. These results clearly show that it is impossible to put a simple figure on what it costs to make a payment, and that average transaction sizes and the overall volume of payments handled by different payment systems have a big impact. These complications are clearly acknowledged in the study, and the results that are reported are more differentiated than the headline figures suggest.

3. The authors suggest that the study's findings might be useful in a constructive debate about the policy measures to improve the efficiency of the payment system. However, in order to do so it is crucially importance fully to understand the difficulties encountered in measuring the cost of payments. This is particularly so because collecting data on payment system costs is far from easy, especially when the aim is to collect data for a wide range of countries with different payment systems and habits. There are good reasons to believe that the ECB analysis under-estimates the cost of cash and over-estimates the cost of card payments because of the omission of consumer costs, and because of biases in the sample of countries (and possibly merchants).

4. This report provides a brief review of the ECB study. We summarise the key results in the next section, and then identify methodological issues and limitations, which may bias the allocation of costs to the various payment instruments. In particular we discuss:

    - the importance of scale economies in assessing the relative efficiency of the various payment instruments (Section 3); and

[1] The authors of the study note that it was essential that all participating entities followed and adopted a common methodology and reporting scheme to the greatest possible extent. However, they also note that the final decision regarding the composition of the samples of the cash-in-transit companies and of the retailers was left to the discretion of the participating central banks.

[2] All data was collected for the reference year 2009.

- how the exclusion of consumer and household costs and biases in the country and merchant samples may skew the results in favour of lowering the costs of cash payments (Section 4).

5. We highlight a number of additional issues that affect cost measures in Section 5 and draw conclusions in Section 6.

2 Summary of ECB results

6. The ECB report collects data on the costs of six retail payment instruments across a sample of 13 EU countries for the reference year 2009. The study includes remote purchases, over-the-counter purchases and other purchases, such as services with reoccurring invoicing, defining retail payments "*as non-critical payments of relatively low values, i.e. of less than €50,000.*"[3]

7. The 13 European countries represent about 40% of European retail payments by volume and about 18% by value. The country sample is slightly biased towards countries with higher cash usage. Across the countries covered by the sample more than two-thirds of all payments (by number) are made in cash. This is higher than the EU27 average of 60%.

8. The study distinguishes between internal and external cost for a stakeholder in the payment value chain. External costs are fees paid to other stakeholders in the payments value chain, and will therefore cancel out in any end-to-end measure of net costs (as they represent revenues to other stakeholders in the payments value chain). Internal costs are all other payment related costs. The study defines private cost for stakeholders in the payment value chain as the sum of their internal and external costs. Social costs are measured by internal costs (i.e. private costs less the fees paid to other stakeholders in the value chain).

9. Excluding costs incurred by consumers and households, the weighted average total social cost of retail payments in the sample is around 1% of GDP, but there is substantial variation (with social costs ranging from 0.42% to 1.35% of GDP).

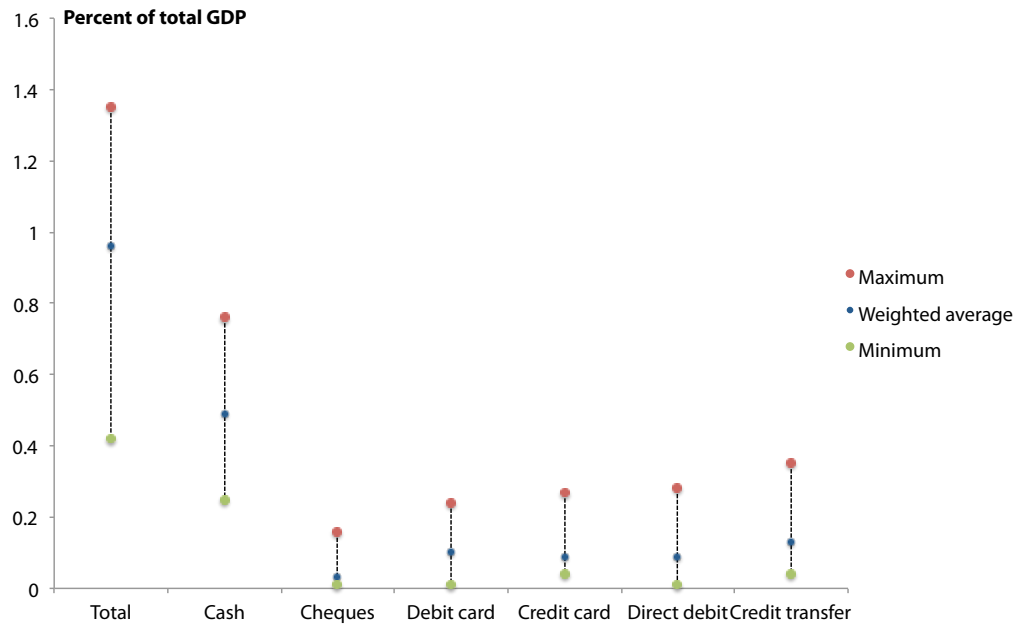
10. The bulk of social costs is incurred by banks and infrastructure providers (51%) and retailers (46%). 3% fall on central banks, and 1% of costs are incurred by cash-in-transit companies.

11. Although the authors have excluded the costs to consumers and households, they note that recent data from Denmark and Hungary suggest that these costs amount to 0.2% of GDP on average. This means that households and consumers incur almost half the costs that are incurred by retailers.

12. Cash accounts for the largest share of total social cost, as shown in Figure 1. However, this merely reflects the fact that cash is the most widely used payment method, accounting for between 36% and 97% of the total number of retail payments, and between 1% and 9% of the total value of retail payments in the sample countries.

[3] ECB (2012), p 10.

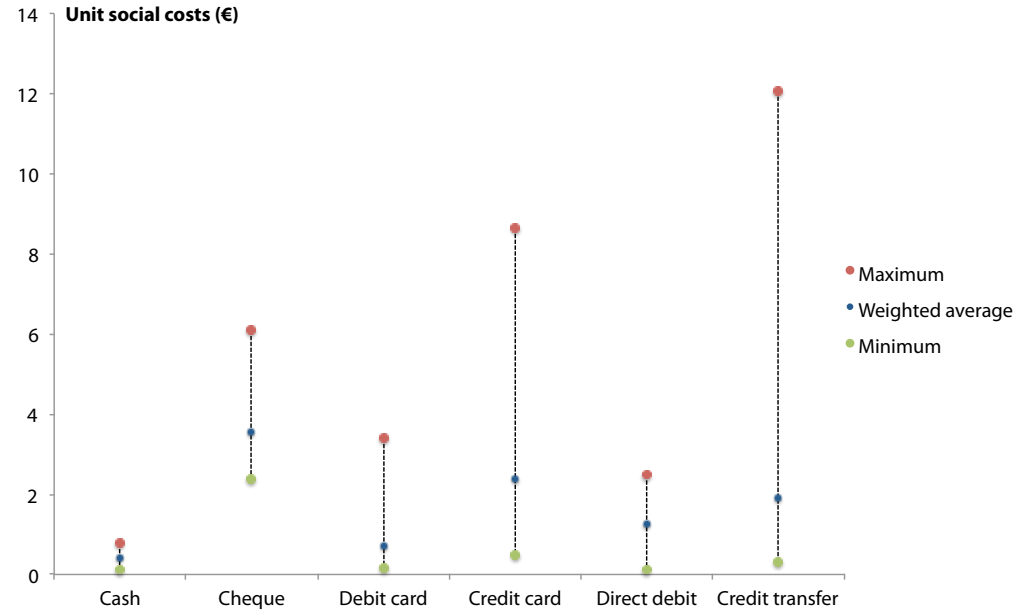
Figure 1: Summary of social costs (average of sample countries)



Source: Table 7, ECB (2012).

13. Looking at social costs per payment, cash has, on average, the lowest costs (see Figure 2). Even so, in 5 of the 13 countries debit cards have lower costs per transaction than cash.

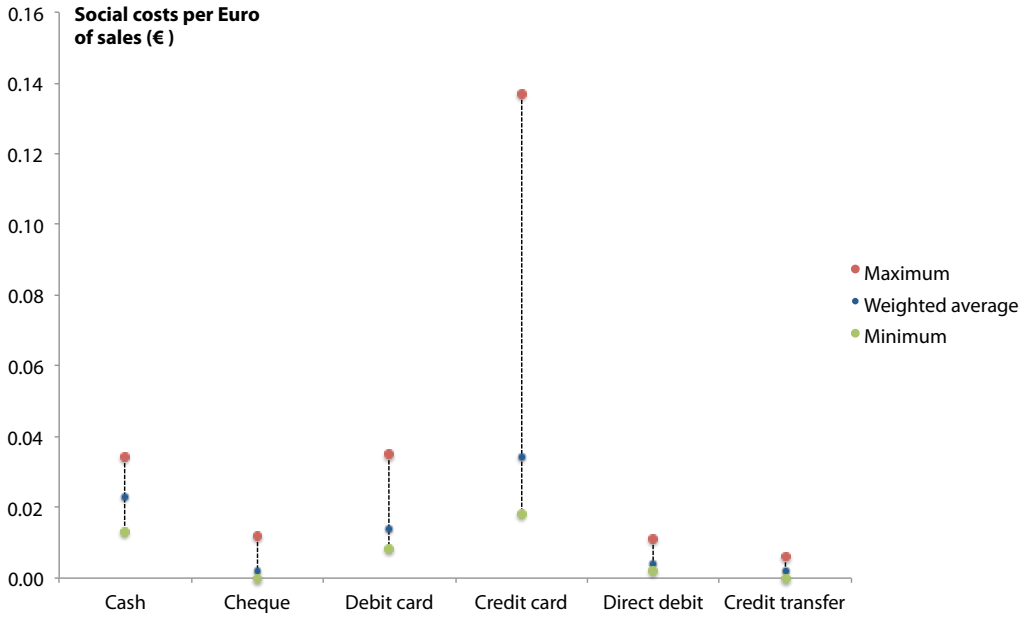
Figure 2: Unit social costs per payment instrument



Source: Table 9, ECB (2012).

14. Looking at cost as a proportion of transaction value, debit cards are on average cheaper than cash, but there is again considerable variation, as Figure 3 shows.

Figure 3: Social costs per € of sales per payment instrument



Source: Table 9, ECB (2012).

15. The large variance in the social costs of card payments may be attributed to the fact that card payment costs are largely fixed with respect to transaction values (see Figure 5 in Section 3.2), and therefore differences in the value of card payments across sample countries have a large impact on cost as a proportion of sales. This highlights the more general point that economies of scale are important in assessing the efficiency of payment instruments.

3 Economies of scale are substantial and important for efficiency considerations

16. The costs of making payments change with transaction values and volumes, and the extent to which costs are fixed and variable with regard to these two parameters varies across payment instruments.

17. Various studies on the cost of payment instruments indicate that the costs of card payments are largely fixed, both in terms of the number of transactions and transaction value, whereas cash costs vary more with both the number of transactions and the value of transactions. This means that card payments benefit to a greater extent from economies of scale than cash payments.

18. Throughout the ECB report references are made to transaction volumes and unit costs. Economies of scale are also discussed in this context. However, the ECB does not split payment costs into fixed and variable components and does not include any analysis of the economies or diseconomies of scale that are present when the values of transactions change. Without such information it is difficult to determine how payment costs will fluctuate with changes in payment habits.

19. In the presence of economies of scale, looking purely at the unit costs of payment systems is not particularly useful for considering relative costs. As the sample is biased towards cash transactions it will tend to under-report the costs for cash (see Figure 2). This does not imply that cash is more efficient than cards, because it is merely a consequence of the fact that the fixed costs of cash are spread over a larger number of transactions. Likewise in countries where cards are not widely used, the unit costs of card payments will be high simply because many of the costs of card payments are fixed and spread over a small number of transaction or a low total value of sales.

20. A more detailed look at the costs of cash and cards indicates that card payments benefit from stronger economies of scale in terms of transaction volumes and values. This suggests that replacing cash payments with debit cards could lead to substantially lower social costs of payments.

3.1 Economies of scale in volume

21. When a certain proportion of total costs is fixed with regard to the number of transactions made with a particular payment system, unit costs will fall as the number of transaction increases. The payment instrument benefits from economies of scale in volumes. Comparing unit costs at different levels of usage is therefor misleading. Lower unit costs may simply be the consequence of greater volumes.

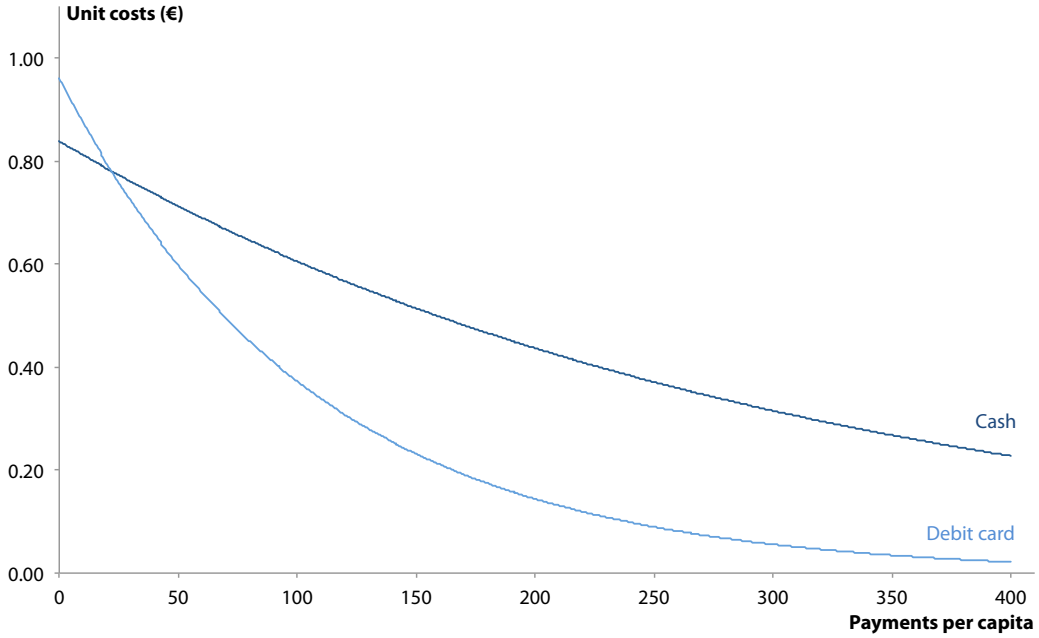
22. Some of the social costs of cash and card payments do not increase with the number of transactions. Therefore both cash and card payments benefit from economies of scale. For example, even though the size of an ATM network may adjust to some extent to changes in the level of cash usage, a substantial proportion of investment in the network is fixed and does not vary with the number of cash transactions. Similarly, investments in a network of point of sale (POS) terminals that support the use of payment cards will not vary with

the number of card transactions. The greater the number of transactions, in the short run, the smaller the cost of the infrastructure per transaction made.

23. The study discusses scale economies in relation to the number of transactions for each of the payment instruments, presenting a graph where payments per capita are being plotted against unit costs.[4] The authors point out that the downward sloping graphs indicate that all payment instruments benefit from economies of scale, and note that 'cash has the steepest slope'. From this they conclude that cash payments have greater economies of scale.[5]

24. However this statement is unsupported because the diagrams are drawn to different scales, which affects the visual appearance of the slope of the curves. Placing both curves on the same scale indicates that economies of scale are stronger in relation to debit card payments than they are for cash (see Figure 4). Increasing the number of payments per capita from 100 to 150 payments per capita leads to a reduction in the unit cost of debit card payments by approximately 30% whilst the unit costs of cash payments fall only by approximately 15%.

Figure 4: Economies of scale in volume



Source: Based on Chart 2 a) and b) ECB (2012). Trend lines were added to estimate costs for payments per capita volumes that were not available in the ECB's report.

25. Moreover, except at very low levels of usage, unit costs of card payments are consistently lower than the unit cost of cash payments once the payment

[4] See Chart 2, ECB (2012).

[5] See pp 28, ECB (2012).

volumes are considered (see Figure 4). This implies that replacing cash payments with debit card transactions should result in substantial cost savings. Indeed, comparing data from the ECB report for the Netherlands with figures from an earlier study of payment system costs suggests that substantial cost savings have been achieved by replacing cash transactions with non-cash transactions. The social cost of all payment instruments as a percentage of GDP in the Netherlands has fallen by 35% in the period 2002-2009. This has been accompanied by a major shift in payment habits: over this period, cash usage has fallen from 85% to 37% of retail transactions by volume, and 56% to 1% in terms of value in 2009.[6]

3.2 Economies of scale in value

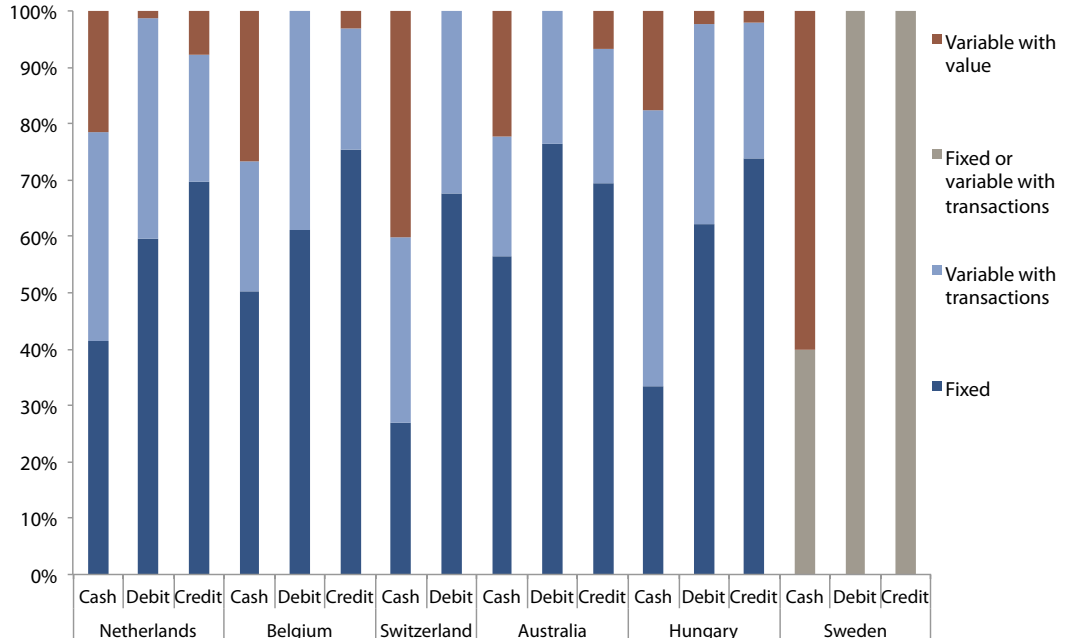
26. While card payments benefit from economies of scale in terms of the number of transactions, they benefit from even stronger economies of scale in terms of transaction value. Most of the social costs of card payments do not vary with either the number or the value of transactions, and of those costs that do vary, most vary with the number of transactions (see Figure 5). For example, the social cost of obtaining authorisation, crediting the merchant's account and debiting the account of the customer occurs every time a card payment is made, but it is not related to the value of the transaction.

27. In contrast, the cost of cash is driven to a larger extent by the value of cash purchases (see Figure 5). This is not surprising given that the costs of distributing cash – which account for a large proportion of total costs – are likely to vary with the value of cash sales. Similarly, the cost associated with the risk of loss and theft, or the insurance premiums for covering against that risk, vary with the value of cash transactions. Last but not least, time taken at the point of sale is likely to be greater for higher-value transactions.[7]

[6] According to Brits and Winder (2005) cash represented 85% of all payments by volume and 56% by value in 2002. Note that GDP has only increased by 2% during the period 2002-2009 therefore the large drop in social costs, as a percentage of GDP, is not driven by an increase in GDP (source: Eurostat).

[7] For example, the Australian payments cost study found that the time taken at the counter to process a specific cash transaction is likely to vary according to the number of notes and coins, meaning that, on average, more time is required for high-value cash payments than for lower-value payments. See "Payment Costs in Australia, A study of the payment methods" Reserve Bank of Australia, November 2007.

Figure 5: Share of fixed and variable costs



Source: Bergman et al. (2007), De Nederlandsche Bank (2004), Banque Nationale de Belgique (2005), Minsch et al. (2007), Reserve Bank of Australia (2008) and Magyar Nemzeti Bank (2011); own calculations. The Hungarian study distinguishes between costs that vary linearly with the number or value of transactions, and costs that vary less than proportionately, and for the purpose of this diagram we have grouped both together.

28. Hence, costs as a proportion of sales decrease dramatically as cards are used for a greater proportion of retail transactions. An increase in the share of the total purchase value of card payments, coupled with a decrease in the value of cash transactions is likely to reduce the total costs of making payments. Indeed, a number of reports on the costs of payment instruments have submitted that from about €8 upwards debit cards are the most efficient payment instrument, and that for purchase amounts above €60 cash becomes more expensive than credit cards.[8]

29. Economies of scale can also explain the large variance in the cost per euro of debit and credit card payments presented in the ECB report (see Figure 3). This variance is likely to reflect the wide variance in the value of card payments across the sample countries. In countries such as Hungary the total value of card payments is low and fixed costs are therefore spread over a small value of transactions, which leads to high costs per Euro. In other countries, such as Sweden, fixed costs are spread over a large value of card transactions leading to low per-Euro costs.

[8] See: Bergman et al. (2007); De Nederlandsche Bank (2004); Banque Nationale de Belgique (2005); Reserve Bank of Australia (2008); and Minsch et al. (2007).

30. This means that without more detailed information about the proportion of costs of cash and card transactions that are fixed or variable with regard to volume and value, one needs to be careful in drawing conclusions about an efficient mix of payment instruments. The ECB study on its own does not provide sufficient information to draw firm conclusions.

4 Limitations of the study bias results in favour of cash

4.1 Consumer costs are higher for cash than for cards

31. The ECB study excludes the social costs of payment instruments for consumers and households because these costs are difficult to measure.[9] However, this exclusion is far from innocuous because (a) the social costs of payment instruments to consumers and households are substantial and (b) they do not fall in equal measure onto the different payment instruments. More specifically, other studies suggest that consumer costs for cash are likely to be higher than those for card payments. Excluding consumer costs from the study will therefore skew the results in favour of cash payments.

32. For example, a study conducted by the Australian Central Bank found that excluding consumer costs decreased the cost of cash by 23%, the cost of debit cards by 14% and the cost of credit cards by 17%.[10] Similarly, a study conducted by Gresvik and Haare in Norway suggests that consumer costs account for about 24% of the social cost of cash, but only 15% of the social cost of cards.[11]

33. In both the Australian and Norwegian studies the main resource cost incurred by consumers is the time to make payments at the point of sale and time spent on other related activities, such as making cash withdrawals and checking credit card statements.

34. Both these studies exclude the opportunity cost of holding cash, which arises from the foregone interest on the cash holdings, and the costs associated with bearing the risk of loss or theft. A study conducted by Bergman et al shows that the consumer costs of cash can be substantial when the perceived risk of loss and theft are also included in the calculation of the opportunity cost of cash.[12] The perceived risk of loss and theft is difficult to calculate, but Bergman et al estimate that true opportunity cost of holding cash, which includes the perceived risk of loss and theft, can be more than four times the interest lost on the consumers' cash holdings.

35. Hence, excluding consumer and household resource costs of payment instruments is likely to skew the results in favour of cash payments. This effect needs to be taken into account before the ECB findings are being used to inform the debate about appropriate policies to improve the efficiency of the payment system.

[9] See pp 12, ECB (2012).

[10] See pp 25 Reserve Bank of Australia (2007).

[11] See Gresvik, O and Haare, H (2009a).

[12] See pp 9-10, Bergman et al. (2007).

4.2 Sample of merchants and countries are biased towards cash

36. Given that there are strong economies of scale in relation to all payment instruments, the representativeness of results will depend on the representativeness of the sample in terms of payment system usage. Even small deviations could have a strong impact on average costs, and this impact needs to be considered when interpreting the results.

37. In terms of volume, cash payments account for on average 69% of transactions in the thirteen countries sampled while cards account for 14%.[13] The corresponding figure for the EU27 member states are 65% and 14% respectively.[14] Countries such as Luxembourg where cash transactions only represent 29% of all payments by volume are excluded from the sample while Greece, Italy and Romania that are highly reliant on cash transactions (86-96%) are included.[15] The sample covers 46% of EU cash payments but only 30% of non-cash payments (by volume). The bias towards cash using countries is even more significant when considering the value of EU cash and card transactions represented in the sample – the sample only represents 18% of EU non-cash transactions by value. As a result, the average figures for cash are too high and those for card payments are too low compared with the true average. In the skewed sample economies of scale should be substantially larger for cash than for non-cash payments, despite economies of scale being generally stronger for card payments.

38. Also, for non-cash payments the sample accounts for a larger share in volume than in value. This holds for the sample overall and for each participating country individually. The sample misses countries (such as France, Germany and the UK) that account for a larger value than volume of non-cash transaction. The relative low share of transaction value seems related to the fact that the GDP per capita for the sample is significantly below EU average, and implies that average transaction values are below the level that would be representative. Even though this may affect all payment systems in a similar manner (i.e. the average transaction value is lower for all payment systems), the impact would tend to be larger when we consider card payments as they have stronger scale economies than cash payments.

39. A result that has attracted some attention is that credit card payments take on average slightly longer at the POS than debit card payments, with a substantial difference in the median time, although there should be no systematic difference between the two methods of payment.[16] At the same time, we note that Spain, Greece and Italy stand out in the sample as they have a higher share of credit card payments than debit card payments. For all other

[13] See Table 4, ECB (2012).

[14] See Table 4, ECB (2012).

[15] See Table 4, ECB (2012).

[16] See pp 7, PaySys (2012).

countries in the sample debit card payments exceed credit card payments by a factor between 3 and 20. This may be explained by the fact that (international scheme) credit cards are the preferred non-cash payment instrument for tourists abroad.

40. If this were the case, one would expect to see precisely the result that handling credit card payments takes longer at the POS than handling debit card payments. Because customers paying with credit cards are more likely to be tourists, transaction time for card payments would be biased upwards as a result of factors such as language barriers, for example, which have nothing to do with an intrinsic difference between card and cash payments, but simply arises because the average credit card user is more likely to be a tourist than the average debit card or cash user. This could at least in theory contribute to the explanation of the substantially higher median time requirement for credit cards at POS compared with debit cards. It also shows quite clearly that there are a number of potentially very complex effects that need to be taken into account when trying to come up with a reliable measure of the cost of different payments.

41. More generally, the EU member states clearly have different payment profiles. For example some countries have a much higher share of non-cash payments or higher average transaction values than others. The extrapolation from the sample to the EU27 makes no attempt to account for this. In particular the omission of France, Germany and the UK from the sample may have a strong impact on the results as these countries have significantly different payment profiles from the countries in the sample.

5 Further issues

5.1 Merchant sample is unreliable

42. Merchant costs are an important component of the overall cost of payment systems, and the way in which the sample represents costs to retailers is a potential cause for concern.

43. The ECB correctly identifies the importance of including a wide range of merchants in the sample, i.e. merchants of different sizes and different industry sectors, because the costs and benefits of accepting different payment methods could differ among the retailers as a result of those characteristics. Unfortunately, very little is known about the sample methodology for selecting merchants as this was at the discretion of the participating central banks.

44. The extent, to which central banks conformed to the merchant sample guidelines provided by the ECB, is unclear. What is clear, however, is that the number of merchants sampled varies widely across the participating countries. For example, in Greece the merchant sample included only 6 respondents, while the Romanian sample covered 1038 merchants.[17] This reflects the fact that participation in the survey was voluntary and that some central banks, such as the Romanian central bank, commissioned external research firms to conduct the surveys. External research firms appear to have obtained better participation rates from merchants.[18]

45. Regardless of the reasons for the huge difference in participation levels, one must have serious doubts about the representativeness of the merchant sample overall, and thus about the robustness of the merchant cost estimates. As merchant costs account for a large proportion of total costs of payment systems, this means that the final cost figures are similarly unreliable.

5.2 Measurement issues

46. There are substantial issues with the correct measurement of costs, in particular in relation to credit card costs. As the study considers only the payment functionality of cards, it attempts to exclude all costs related to the credit function that is bound to credit card payments. It is unclear how this cost split has been achieved, and in particular how common costs have been treated. For example, a merchant may invest in POS equipment to give its customers the option of non-cash payment. But equally the merchant might want to offer its customers the option of being able to access credit through making credit card purchases (or through using own-brand store cards). This means that some of the costs of the POS infrastructure may be driven by the fact that credit cards have additional functionality.

[17] See Table 2, ECB (2012).

[18] See Table 2, ECB (2012).

6 Conclusions

47. The ECB study provides a valuable attempt at collecting data on the usage and costs of different payment systems in thirteen EU member states. However, considerable care is required when trying to use the results in any debate about the appropriate policy towards payment instruments. The study highlights the enormous difficulties associated with a comprehensive and reliable collection of payment system cost measurements, in particular where the costs to retailers are concerned. The study also shows the importance of scale economies, which can only be properly captured when cost measures are broken down into costs that vary with the value of transactions and/or the number of transactions, and costs that vary with regard to neither of these two measures.

48. The study's authors clearly acknowledge these difficulties and try to highlight the effects of scale economies, but are not in a position fully to address the question where scale economies are strongest, and what implications this has for a comparison of relative efficiency. There are also biases in the sampling that suggest a bias in favour of cash.

49. For all of these reasons, the ECB study's results are of limited value. Whilst the inherent limitations are often acknowledged in the main body of the text (though sometimes relegated to footnotes), they are not reflected in the presentation of headline results. We believe that the main conclusions that can be drawn from the study are not the specific cost estimates but the enormous difficulties of measuring the cost of payment systems robustly and reliably.

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