# Costs in the Norwegian Payment System

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## Abstract

We calculate social and private cost for the use and production of payment services in Norway for 2007. The calculations include banks', merchants' and households' cost for cash, cards and giro payments. The social cost is calculated to be 0.49 % of GDP, or NOK 11.16 billion. Costs are also calculated on a per-service basis. The results are compared with data from earlier cost surveys by Norges Bank. The unit costs of the most popular services have decreased over the years. Efficiency and productivity of banks' payment service operations has improved. We also make comparisons between frameworks, methodologies, and results from cost surveys in five European countries.

**Keywords:** Cash payments, Card payments, Giro payments, Social costs, Private costs, Unit costs, Banks' efficiency.

**JEL classifications:** D 12, D 23, D 24

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# Contents

# Foreword

This is the fourth study Norges Bank has conducted on costs in the payment system. Conducting cost studies is one of several approaches to understand and analyse the efficiency in the payment system. As stated in section 1 of the Central Bank Act (1985): "Norges Bank (…) shall (…) promote an efficient payment system domestically as well as vis-à-vis other countries (…)"

The 2007 cost study was initiated in 2006, and the results were published in 2008 and 2009. The analysis was initiated by Norges Bank, (the Payment Systems Department and supported by the Governor), mainly conducted by two economists in the Payment Systems Department with support from the Cashier's Department. The analysis has been conducted using approximately two and a half man-years / full time equivalents in the Central Bank.

The study has benefited greatly from the support offered by banks' and merchants' associations. The Norwegian Financial Services Association (FNH) and The Norwegian Savings Banks Association (Sparebankforeningen) shared information of their cash survey questionnaire, which were embedded in the bank survey (see chapter 4). 12 banks responded to the bank survey.[2] The federation of Norwegian commercial and service enterprises (HSH) and the Norwegian Hospitality Association (NHO Reiseliv) offered help in developing and conducting the merchant survey (see chapter 5). The Household survey was conducted by Norges Bank using a market analysis company (Norstat AS).

[2] These were: Andebu Sparebank, Halden Sparebank 1, Larvikbanken Brunlanes Sparebank, Sparebanken Vest, Sparebanken Øst, Sparebank 1 Midt-Norge, Sparebank 1 Vestfold, DnB NOR Bank ASA, Skandiabanken AB, Sparebanken Pluss, Fokus Bank ASA and Handelsbanken filial Norge. Unfortunately only one (of the two major) card acquirers responded: Elavon Merchant Services. Due to anonymity reasons, their data is not published.

# 1 Introduction

## Scope, purpose and background

To our knowledge, the Norwegian Cost Study 2007 has a more comprehensive scope[3] than any cost survey on payments conducted so far. The analysis includes all participants in the payment chain; banks and their subcontractors, merchants and households. The costs of cash-, cards- and giro-services are calculated. The study shows that modern and efficient payment services are produced at a low cost.

The purpose of this analysis is to assess total costs of payments in Norway in 2007 and look at the development over time.

The 2007 survey is a follow up of previous studies, the latest one in 2001. We analyse the cost developments in the period 2001-2007. We also make comparisons with recent cost surveys conducted in other countries. The scopes of these surveys are not identical and the methodologies and payment systems differ. One should therefore be cautious when comparing the results.

The Norwegian 2007-survey covers social costs as well as private costs for the different agents and instruments. We calculate unit costs for a range of payment instruments. We also show some indicators of development of banks' productivity and efficiency since 1988.

### Related documents:

There are several related documents to the cost study. All can be found on Norges Banks website:

Staff memo 5/2009: "Costs in the Norwegian Payment system: Questionnaires"

Economic Bulletin 1/2009: "Costs in the payment system", (a short text on the analysis) also in Norwegian: Penger og Kreditt 1/2009: "Kostnader i betalingssystemet"

Staff Memo 6/2008: "Payment habits at point of sale. Different methods of calculating use of cards and cash in Norway"

Information used in the analysis is obtained from three surveys; on banks, merchants and households respectively. Information from Norges Banks' Annual Report of Payment Systems 2007 and general information from Statistics Norway are also used.

[3] "Scope" is the number of agents and instruments which are included in the survey. The instruments and agents not included in the scope are: cheque, e-money, interbank transfers and cross-border payments and the cost of billing institutions.

We would like to add that public's payment instrument preferences are not based on costs alone, but on a range of practical considerations.

## Results

The social cost of the Norwegian payment system is calculated to be 0.49 % of GDP, or NOK 11.16 billion, producing 1.8 billion payments in 2007.

Social costs calculated on the basis of production costs and user costs. In Norway the production costs, mainly costs in banks and at banks' subcontractors, account for about 2/3 of social cost. When distributing social cost on cash, cards and giro we find that card payments accounts for about half the costs.

In the analysis cash use is estimated to be about 14 % of the value and 24 % of the number of transactions at point of sale. This is low compared to other countries. In spite of this, cash represents 31 % of social costs.

For many years, prices on payment services in Norway have reflected relative differences in the costs. This has contributed to the phasing out of manual/paper-based services. In 2007 96 % of non-cash payments were electronically processed in Norway.

Calculation of unit costs per payment for the 26 most important services in Norway show that high-volume, electronic services have the lowest unit costs. The banks' cost for such services has been reduced since 2001.

Banks' efficiency/productivity and their cost recovery have improved over time. Banks' costs have been reduced since 1988, while the number of transactions has quadrupled. The cost recovery is the highest recorded in these cost surveys.

## Contents of the Memo

In chapter 2 calculations of the social costs are described. Costs are distributed on the different agents and on the different main groups of payment instruments. Chapter 3 show estimates on the number of cash payments. In chapter 4 we calculate costs in banks and look at developments over time. We proceed by estimating merchants' costs in chapter 5, and in chapter 6 the households' costs. In chapter 7 we reproduce information from surveys

carried out in four countries, and compare them to our own study on scope, methodology, results etc. We conclude in chapter 8 looking at some experiences gained and some thoughts about future surveys.

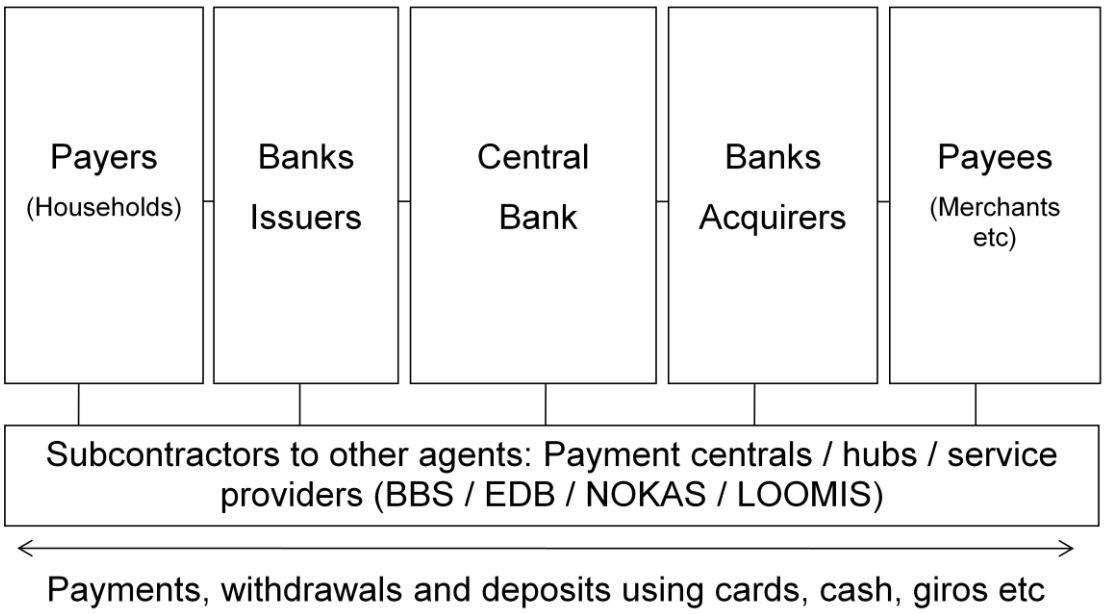
Details on the methodology and framework used in chapters 2 to 6 are found in the appendixes. The spreadsheets and questionnaires used are published in a separate Staff Memo, No Y 2009.

# 2 Social cost

## What is social cost?

Social costs are "the total costs to the society reflecting the real use of resources in the production of the industry's output"[4]. A useful approach to illustrate where the costs occur is to describe the payments process as a supply chain, the payment chain. In the payment chain, the agents have different tasks in producing or using the payment services. All agents carry costs, generated by their own activity (own production costs) and by the costs incurred through fees etc paid to other agents in the chain. For example, the banks use subcontractors to produce many payment services.

## Illustration 1: The payment chain




[4] Bergman et al 2007, p. 4 Note that we assume negative externalities from payments to be marginal or nil; and they are therefore ignored in the calculations. Positive externalities exists in payment systems (for example network externalities in card systems), but as the positive externalities would count as benefits, they are outside the scope of the analysis.

Offering payment services to customers (payers / payees) spur a range of activities that generate costs in the banks (own production costs). Also, the delivery of payment services from the subcontractor is paid for by the banks (subcontractor costs). The own production cost at subcontractors is the income from their customers (banks) less profit. The sum of own production costs at each agent in the payment chain is the social cost.

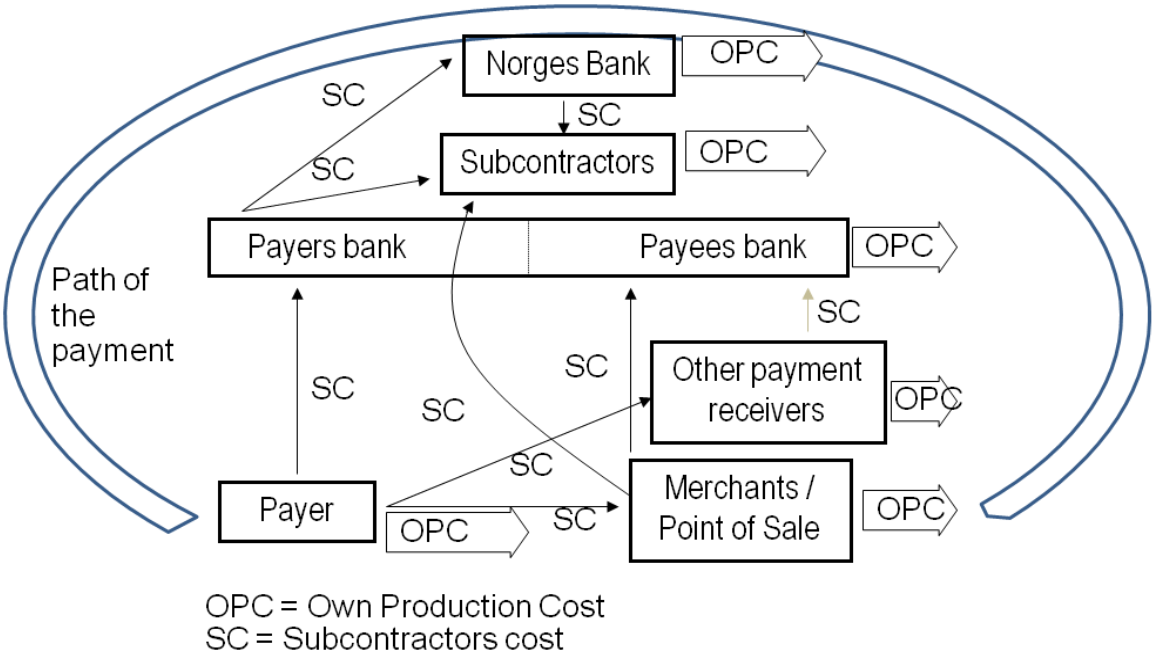
The agents in the payment chain are banks, the central bank, merchants, subcontractors and households. In this chapter we calculate the social cost for these agents. Further details on calculations for each agent are found in chapters 3, 4 and 5 and the appendixes to these chapters.

## Methodology

To analyse the costs of the payment system it is important to have a clear distinction between *private* and *social cost. Private cost* is an agent's total costs. Private cost consists of own production cost and fees paid, e.g. banks fees to subcontractors and households payment of bank fees for payment services. *Social cost* is the total costs for all agents in a payment chain, when the value of deliveries / fees between the different agents is deducted. Deliveries are costs for the receiving agent and income to the delivering agent. In illustration 2 the cost elements in the payment chain is shown. The regular arrows (marked "SC") represent cost of deliveries. The bold arrows (marked "OPC") represent the own production cost for each agent. The sum of own production cost across the payment chain is the social

cost.

## Illustration 2: Costs in the payment chain




*Net private cost* is the agent's private cost minus fees received from other participants in the chain (income from deliveries). If the private cost minus fees is positive, the agent incurs a loss. Also, *seigniorage cost* is important (see appendix to chapter 2). For households, merchants etc the seigniorage is the interest loss incurred by holding cash. Holding cash is an alternative to holding deposits, which normally give an interest income. The foregone interest can thus be considered to be a cost, the *seigniorage cost*. For the central bank seigniorage is income, as the central bank potentially can invest the interest-free "loan" represented by notes and coins in circulation[5].

The basic methodology to calculate costs in this analysis is to multiply the number of transactions of the individual payment service (cash, cards etc) by the estimated unit cost of producing or consuming the service.[6] The estimated number of transactions is based on

[5] Note that seigniorage can be defined as: The difference between the face value of a coin and the cost of producing, distributing and retiring it from circulation. Seigniorage derived from notes is the difference between interest earned on securities acquired in exchange for bank notes and the costs of producing and distributing those notes.

[6] The calculations are shown in chapter 5, 6, and 7, and also in A 5, A 6 and A 7

information from domestic payment statistics from Norges Bank for card payments, cash withdrawals and deposits and for giro payments. The number of cash payments is based on information calculated from the household survey in combination with domestic statistics[7]. The number of transactions in Norway 2007 is shown in the Table 1[8].

**Table 1:** Number of transactions at point of sale in Norway, 2007.
Source: household survey and Norges Banks' Annual Report on Payment Systems

| Base: residents | Transactions | | Value | |
|---|---|---|---|---|
| | Million transactions | Per cent | NOK billion | Per cent |
| **Point of sale total** | **1209.0** | **100.0 %** | **432.1** | **100.0 %** |
| **Cash use** | **285.0** | **23.6 %** | **62.1** | **14.4 %** |
| **Card use total** | **924.0** | **76.4 %** | **370.0** | **85.6 %** |
| BankAxept | 805.3 | 66.6 % | 298.1 | 69.0% |
| Petrol companies cards | 21.6 | 1.8 % | 10.8 | 2.5% |
| Visa, MasterCard, American Express and Diners Club | 97.1 | 8.0% | 61.0 | 14.1 % |

## Which costs are relevant for the analysis?

There are several approaches to calculating social costs. Traditionally, calculating marginal costs (and marginal prices) is a widely used approach to calculating social costs. However, it is difficult to find the necessary information to calculate marginal values. Marginal cost calculations exclude overhead cost, which is an important element in the payment services production environment. Furthermore, marginal cost analysis cannot take into account major shifts in the use of different services over time. In our opinion, a full-cost study is more suitable and easier to conduct.

The method for calculating private costs of each of the agents is developed in Norges Bank, but partly inspired by the studies in Sweden, Belgium and the Netherlands.

There is no clear-cut answer to which costs should be relevant in a social cost analysis. In our opinion, all direct production or user costs should be included. When it comes to the indirect production costs, questions might arise. For instance, it is often not obvious how to allocate indirect costs in a bank between payment operations and other activities in a bank. Likewise, and perhaps even more difficult, is the question of allocating overhead costs between the different payment instruments. Our choice has been to leave this decision to the individual

[7] See appendix chapter 6 for details
[8] Rounding errors may occur in tables.

bank, but guide them to distribute some specific overhead costs to the payments. All banks followed our advice, and the bank survey thus might show a higher cost level than other approaches, where overhead costs are omitted.

We assume that the time cost of the payment operation in an outlet is the time spent from the till operator has registered all items until the receipt is handed over to the customer. The registering of the goods is not a part of the process that generates costs for payments. This registration is relevant for the accounting procedures of the outlet.

It can be argued that households' costs of holding cash should not be a part of the social cost and we have chosen to exclude the seigniorage cost in the social cost calculation. However, we have made the relevant calculation, and shown the results in the relevant chapters.

It may also be debated to what extent the costs for the infrastructure, for instance household's PC equipment, broadband lines, postal services costs, even roads and bridges, should be included. In principle it should perhaps be included, as payments need the infrastructure to be carried out. We have chosen not to include such costs, as the infrastructure serves several purposes and not mainly payment operations.

The costs in this analysis cover what we consider to be all relevant costs, except bill receiver's bill issuing costs. There is uncertainty of the size of some of the costs, and we have had to make assumptions to calculate other costs. Despite these limitations, this analysis is probably the most extensive analysis of costs in the payment system that has ever been performed.

## Data sources

The calculations in this chapter are based on data from different sources:

- Surveys carried out by Norges Bank (banks, households and merchants)
- Norges Banks' Annual Report on Payment Systems 2007
- Statistics Norway (demography, salaries etc)
- Other sources (for instance: time estimates used in other countries)

The surveys are the primary source of information to calculate unit costs for banks and merchants. The household survey, combined with statistical information from Norges Bank

provide an estimate of the use of cash, cards and giros in Norway (see Gresvik and Haare, 2008).

The choice of sources of information and a discussion of the data quality is elaborated in the appendixes.

# Results

## Costs and income

Using the methodology described above, and survey results, income information from the ORBOF[9] database and prices, the social costs for the main group of instruments are:

**Table 2:** Social cost, per instrument, 2007

| Instrument | NOK billion | Per cent |
|---|---|---|
| Cash | 3.49[10] | 31 .3% |
| Cards | 5.36 | 48 .0% |
| Giros | 2.31 | 20.7% |
| **Sum** | **11.16** | **100.0 %** |

For 2007 the social cost for payments in Norway is equal to 0.49 % of GDP[11]. The social costs of cash and cards (point of sale payments, deposits and withdrawals) equals 0.39 % of GDP.

The social cost can be distributed to the different agents in the payment chain:

**Table 3:** Social cost, per agent, 2007

| Agent | NOK billion | Per cent |
|---|---|---|
| Banks | 4.95 | 44.4 % |
| Norges Bank (The Central Bank) | 0.13 | 1.2 % |
| Households | 2.18 | 19.5 % |
| Merchants and others | 1.53 | 13.7 % |
| Subcontractors | 2.37 | 21.2 % |
| **Sum** | **11.16** | **100.0 %** |

The production side (banks, Norges Banks and subcontractors) represent approximately 67 % of the social costs, while 33 % of the social costs are generated by the consuming side.

The individual agents face private costs, which influence their use of payment services. However, the level of the social cost is useful when considering whether the society as a whole can benefit from a change in payment habits. Both private costs and social costs

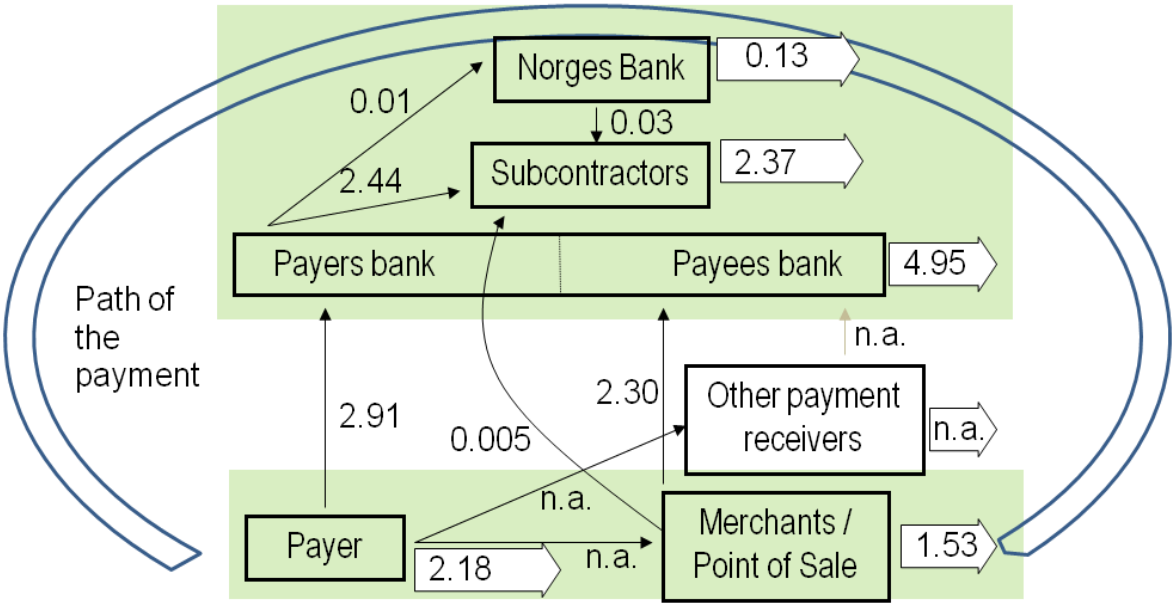
[9] ORBOF is the Norwegian system for bank industry statistical reporting (Offentlig Regnskapsrapportering for Banker og Finansieringsforetak), a cooperation between Statistics Norway, Norges Bank and the Norwegian Financial Services Authority

[10] Average exchange rate Euro/NOK 2007 : 8,0153

[11] Social costs are 0.65 % of GDP Mainland-Norway (0.52 % when based on cash and cards payments only). It is useful to deduct offshore activities (petroleum and shipping) from GDP, as these activities mostly generate income in USD through the wholesale payment system (SWIFT payments etc). These payments are outside the scope of the survey, and it could therefore be more relevant to conclude that the costs of payments to be 0.65 % of Mainland GDP than 0.49 % of GDP.

should therefore be evaluated simultaneously, see illustration 3. For instance, households' private costs of paying is NOK 2.18 + 2.91 = NOK 5.09 billion. Similarly, the merchants and others pay NOK 1.53 + 2.30 + 0.005 = NOK 3.84 billion. The total private cost of all participants amounts to NOK 18.8 billion. The green areas indicate which agents this analysis cover.

## Illustration 3: Social costs in Norway 2007




The calculation of social costs can be shown per instrument and per group of agents. In tables 4, 5 and 6 below, own production cost of agents and fees paid/received are shown. The tables also show private cost and net private costs. A negative value shows a surplus to the participant, while a positive value shows that the participant carries a net private cost. Social costs are the sum of own production costs and are indicated in bold figures in the tables.

**Table 4:** Cash (payments, deposits and withdrawals)

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 485.7 | 0.0 | 485.7 | 506.0 | -20.2 |
| Norges Bank | 154.9 | 27.3 | 127.6 | 6.2 | 148.7 |
| Banks | 2194.6 | 479.6 | 1715.0 | 592.7 | 1602.0 |
| Households | 1440.7 | 592.7 | 848.1 | 0.0 | 1440.7 |
| Merchants and other businesses | 322.1 | 5.2 | 316.9 | 0.0 | 322.1 |
| Sum | 4598.1 | 1104.8 | **3493.3** | 1104.8 | 3493.3 |
| **Social cost** | | | **3493.3** | | |

**Table 5:** Cards

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 1548.8 | 0.0 | 1548.8 | 1613.3 | -64.5 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 3385.7 | 1613.3 | 1772.4 | 2084.6 | 1301.0 |
| Households | 2002.3 | 1185.3 | 817.0 | 0.0 | 2002.3 |
| Merchants and other businesses | 2117.1 | 899.3 | 1217.8 | 0.0 | 2117.1 |
| Sum | 9053.9 | 3697.9 | **5355.9** | 3697.9 | 5355.9 |
| **Social cost** | | | **5355.9** | | |

**Table 6:** Giro

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 334.8 | 0.0 | 334.8 | 348.7 | -13.9 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 1806.7 | 348.7 | 1458.0 | 2531.1 | -724.4 |
| Households | 1645.0 | 1129.3 | 515.8 | 0.0 | 1645.0 |
| Merchants and other businesses | 1401.8 | 1401.8 | 0.0 | 0.0 | 1401.8 |
| Sum | 5188.4 | 2879.9 | **2308.5** | 2879.9 | 2308.5 |
| **Social Cost** | | | **2308.5** | | |

In appendix to chapter 2 calculations for electronic giro, paper-based giro, internet banking, credit transfers, direct debits and other transfers are shown. Furthermore, costs for different card schemes (BankAxept and international payment card schemes) and calculations of cost of cash deposits, withdrawals and payments including seigniorage are presented.

Note that there are two kinds of transactions in the payment system: *payments* and *withdrawals/deposits*. Payments are transactions where a means of payment (deposits or cash) is used to settle a claim. It can be settled immediately, for example when paying for a good or service at the merchant, or by delayed settlement, for example when paying a bill for a service or a good. Deposits and withdrawals are transactions where the means of payment is transformed; from cash to deposits or from deposits to cash. Such transactions are different from payment transactions, and thus involve another cost structure. Payments using cash is only possible when holding cash, so the social cost of cash payments can be

considered to be the sum of the cost of paying, depositing and withdrawing cash[12]. Still, it is useful to show the cost of each element.

In table 7 the social costs, the number of transactions and the transaction values are shown, and also the social unit cost per transaction and the social cost per krone paid. Cost per krone is interesting as the cost of cash use is dependent on the size of the transaction (cash is bulky, and more cash requires more handling, which has costs to the agent).

**Table 7:** Social costs for some instruments

| | Social cost | No. of transactions | Value (NOK) | Social cost per transaction | Social cost |
|---|---|---|---|---|---|
| | NOK millions | Millions | NOK billions | NOK | in øre per NOK |
| **Cash, total** | **3493.3** | **494.7** | **209.3** | **7.06** | **1.67** |
| **Cash, total (dispersed on payments only)** | **3493.3** | **285.0** | **62.1** | **12.26** | **5.63** |
| Cash payments | 514.3 | 285.0 | 62.1 | 1.80 | 0.83 |
| ATM withdrawals | 1 296.8 | 98.5 | 119.1 | 13.17 | 1.09 |
| Other deposits and withdrawals | 1 682.1 | 33.5 | - | 50.21 | - |
| BankAxept cash-back[13] | 0 | 77.7 | 28.1 | 0.00 | 0.00 |
| **Cards, total** | **5 355.9** | **902.4** | **359.1** | **5.93** | **1.49** |
| BankAxept card scheme | 3 326.8 | 805.3 | 298.1 | 4.13 | 1.12 |
| International card schemes | 2 029.1 | 97.1 | 61.0 | 20.90 | 3.33 |
| Debet cards[14] | 2 355.4 | - | - | - | - |
| Credit cards | 965.7 | - | - | - | - |
| **Giro, total (a+b, c+d+e)** | **2 308.5** | **510.7** | **10 428.8** | **4.52** | **0.02** |
| Electronic giro (a) | 1 481.6 | 462.3 | 10 212.2 | 3.20 | 0.01 |
| Paper based giro (b) | 826.9 | 48.4 | 216.6 | 17.08 | 0.38 |
| Direct debits (c) | 130.1 | 49.6 | 219.7 | 2.62 | 0.06 |
| Credit transfers (d) | 2 113.9 | 453.5 | 10 149.4 | 4.66 | 0.02 |
| Other transfers (e) | 64.5 | 33.8 | - | 1.91 | - |
| Internet banking (part of electronic giro) | 1 032.4 | 318.8 | 6 496.3 | 3.24 | 0.02 |
| **Sum society** | **11 157.8** | **1 830.1** | **10 969.1** | **6.10** | **0.10** |
| **Sum Point of sale (cash and cards)** | **8 849.2** | **1 319.4** | **540.3** | **6.71** | **1.64** |

As seen in Table 7, the per-transaction cost of cash payments is relatively low compared with card payments. However, when costs for withdrawals/deposits are included, cash is

[12] Cash payees want to deposit cash, as the cash holdings otherwise would increase to unmanageable size over time, and since they also make bill payments (thus giving rise to a need of converting cash to deposits).

[13] Note that cash withdrawals at the merchant through the BankAxept system does not take time, does not incur a fee and thus does not have a cost the way we calculate this in the analysis. It can be argued that this activity lower the merchant cost of handling cash, since it reduces the cash holdings at merchants.

[14] Costs for debit and credit cards are unfortunately only calculable for banks. This is because merchants were unable to distinguish between credit and debit cards. The costs shown are therefore lower than the total cost of cards.

more expensive per transaction. Distribution of cash is rather costly. The per-transaction cost of electronic giro transactions is low, as giros generally go straight through the payment chain without manual processing and without an extensive point of sale infrastructure which is necessary for cards and cash.

## Costs, benefits and break-even cost analysis

This memo focuses on the calculation of costs in the payment process.

However, the choice of payment instrument when making a payment is based on a number of decision elements, including both costs and benefits. The potential benefits of using an instrument can be substantial and the importance of benefits and costs can vary under changing circumstances.

Other cost surveys determine the break-even cost for payment instruments – the amount where the costs of one instrument is equal to the cost of another instrument (see chapter 6). The break-even cost calculations have been used for calculations on society's savings when substituting one (expensive) instrument with a cheaper one – for example cash and debit cards. We make no such calculations for a number of reasons:

- First, the data we collected was not suited for this purpose. This survey calculates average cost given today's use of the different services, not marginal costs. To make a break-even cost analysis we would have to make many assumptions to generate a marginal cost analysis. The value of such a break-even-cost analysis would be limited.
- Second, the break-even calculations regard fixed costs as sunk. In our opinion, fixed costs matter – infrastructure for payments have to be built, and is not free.
- Third, break-even calculations are rendered as linear cost functions. Economies of scale are important to most payment solutions, and it is likely that the costs are non-linear with increasing amounts paid.
- Furthermore, break-even calculations are based on costs averaged across many businesses. Different stores can face very different cost patterns in payments.

- We might also add that both “cards” and “cash” (or “giro”) cover a number of different services. It could therefore be argued that a break-even cost analysis should be made for each service, not only the rather generic terms of “cash” and “cards”.

The conclusions in a break-even-cost analysis are often rather obvious: services that face an increasing unit cost when amounts paid increase, will not be chosen over instruments that face a flat or decreasing unit cost. Cash and card systems using a price model based on value-related fees will not be preferable. (in the Norwegian payment system BankAxept will be the preferable payment solution, and electronic giro will be preferred over paper-based giro).

Break-even cost calculations can express society’s potential cost savings when substituting one payment instrument with another. However, the calculation will not express which benefits the society will win when substituting one instrument with another.

The average payer probably has an impression on which benefits and which costs he/she faces when choosing a payment instrument. A good description and analysis of the benefits and costs in the choice of payment instrument is given in Nationale Bank van België (2005).

In the table below we try to identify the most relevant decision factors to the different agents (payers, payees and banks). Some of the factors are interrelated. Both positive and negative (benefits and costs) are listed. For some purposes only some of the instruments can be used.

**Table 8:** Which elements affect the decision to choose the instrument in a given situation (benefits and costs)?

| | Cash | | | | | | Bank-Axept | | | International payment cards | | | Electronic giro | | | Paper-based giro | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Payment | | | Withdrawal/deposit | | | Payment | | | Payment | | | Payment | | | Payment | | |
| | Payer | Payee | Bank | Payer | Payee | Bank | Payer | Payee | Bank | Payer | Payee | Bank | Payer | Payee | Bank | Payer | Payee | Bank |
| **Acceptance** | | | | | | | | | | | | | | | | | | |
| Legal tender? | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | No | No | No | No | No | No | No |
| Dependent on terminal? | No | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| P2p / b2b acceptance? | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | No | No | No | No | No | No | No |
| Used at point of sale? | Yes | Yes | Yes | NR | NR | NR | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | No |
| Used over Internet? | No | No | No | NR | NR | NR | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Used for bill payments? | No | No | No | NR | NR | NR | No | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes |
| **Security** | | | | | | | | | | | | | | | | | | |
| Loss | R | R | R | R | R | R | RRF | RRF | RRF | RRF | RRF | RRF | NR | NR | NR | NR | NR | NR |
| Theft | R | R | R | R | R | R | RRF | RRF | RRF | RRF | RRF | RRF | NR | NR | NR | NR | NR | NR |
| Forgery /counterfeit | RRF | RRF | RRF | RRF | RRF | RRF | RRF | RRF | RRF | RRF | RRF | RRF | NR | NR | NR | NR | NR | NR |
| Fraud /misuse | NR | NR | NR | NR | NR | NR | RRF | RRF | RRF | RRF | RRF | RRF | NR | NR | NR | NR | NR | NR |
| **Confidentiality** | | | | | | | | | | | | | | | | | | |
| Anonymity | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | No | No | No | No | No | No | No |
| Transaction traceable | No | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Speed** | | | | | | | | | | | | | | | | | | |
| How fast is the payment? | Relevant | Relevant | NR | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| How fast is the withdrawal/deposit? | NR | NR | NR | R | R | R | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR |
| Is there any delay in settlement? | No | No | No | No | No | No | Yes (t+0) | Yes (t+0) | Yes (t+0) | Yes (t+X) | Yes (t+X) | Yes (t+X) | Yes (t+0) | Yes (t+0) | Yes (t+0) | Yes (t+X) | Yes (t+X) | Yes (t+X) |
| **Reliability** | | | | | | | | | | | | | | | | | | |
| Electronic system is operable | NR | NR | NR | NR | NR | NR | R | R | R | R | R | R | R | R | R | NR | NR | NR |
| Manual system is operable | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mixed manual/electronic system is operable | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR | NR | NR | NR | R | R | R |
| **User friendliness** | | | | | | | | | | | | | | | | | | |
| Treshold: reading/writing skills necessary? | NR | NR | NR | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| Treshold: math skills necessary? | NR | NR | NR | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| Is this practical/simple to use? | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| **Budget management** | | | | | | | | | | | | | | | | | | |
| Immediate settlement | Yes | Yes | NR | Yes | Yes | Yes | No | No | No | No | No | No | No | No | No | No | No | No |
| Delayed (automatic) settlement | No | No | NR | No | No | No | Yes (t+0) | Yes (t+0) | Yes (t+0) | Yes (t+X) | Yes (t+X) | Yes (t+X) | Yes (t+X) | Yes (t+X) | Yes (t+X) | Yes (t+X) | Yes (t+X) | Yes (t+X) |
| Delayed (separate) settlement: use of credit facility | No | No | NR | No | No | No | No | No | No | R | R | R | No | No | No | No | No | No |
| **Availability** | | | | | | | | | | | | | | | | | | |
| Is shortages possible? | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Is ATM available? | NR | NR | NR | R | NR | R | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR |
| Is Branch available? | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR | NR | NR | NR | R | R | R |
| Is POS terminal available? | NR | NR | NR | R | R | NR | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR |
| Is Internet payment solution (in shop) available? | NR | NR | NR | NR | NR | NR | R | R | R | R | R | R | NR | NR | NR | NR | NR | NR |
| Is Internet banking available? | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | R | R | R | R | R | R |
| Is p2p / b2b etc possible (no terminal)? | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | No | No | No | No | No | No | No | No |
| **Amount** | | | | | | | | | | | | | | | | | | |
| Used for micro value (>100 NOK) | Yes | Yes | NR | Yes | Yes | Yes | Yes | Yes | Yes | Seldom | Seldom | Seldom | Seldom | Seldom | Seldom | Seldom | Seldom | Seldom |
| Used for small value (100>500 NOK) | Yes | Yes | NR | Yes | Yes | Yes | Yes | Yes | Yes | Seldom | Seldom | Seldom | Yes | Yes | Yes | Yes | Yes | Yes |
| Used for medium value (500>1000 NOK) | Partly | Partly | NR | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Used for large value (<1000 NOK) | Seldom | Seldom | NR | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Costs (described in detail in text)** | | | | | | | | | | | | | | | | | | |
| Direct (fees etc) | No | No | NR | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Indirect (own production/use cost) | Yes | Yes | NR | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

R = Relevant NR = Not Relevant RRF = Risk Reducing Features (PIN, Signature, ID, Limits etc) t+0 = today t+X = tomorrow or later

# 3 Transactions at point-of-sale - two approaches

The objective of this memo is to calculate payment costs in Norway[15]. It is necessary to make an estimate of number of transactions to do the cost calculation.

For a cards and giros, transaction data is shown in Norges Banks' Annual Report on Payment Systems 2007. However, transaction data for cash use is not found in the statistics. An estimate for cash payments is therefore needed. In this analysis, results from the household survey are used to make this estimate.

There are indications that the household survey may give a too low estimate on cash payments at point of sale. These are elaborated below. We choose to base our calculation on costs on transaction data from the household survey, since it is one of the three surveys in which we have collected necessary information to build this analysis.

This analysis calculates number of cash deposits and withdrawals independently from the calculation of cash payments. We are aware of the (potential) relationship between number/value of cash payments and number/value of cash withdrawals; more cash payments are likely to give more deposits and withdrawals. However, we do not have data that enables us to calculate the impact of this relationship. Our approach is therefore to make two independent calculations: one for payments and one for deposits/withdrawals. This has effects on the cost calculation as well; it is also made of two separate calculations.

To show the impact of methodology and data to our calculation, we present two alternative approaches to estimate the number of cash payments (household survey approach and household consumption approach). Even though the two methods come up with rather different estimates, we show that the effect on costs is moderate.

[15] We start out by calculating the unit cost (per-transaction cost or per payment / withdrawal / deposit cost) for each instrument. The unit cost is multiplied by number of transactions in Norway. This gives the private cost per instrument (chapters 4, 5 and 6). This is done for all instruments for all agents, and summed – thereafter deducting the fees and other subcontractor costs to identify the social cost (see chapter 2).

## Household survey estimate of cash payments

We have calculated the cash use to be 285 million transactions in 2007. Using the survey average cash payment value of NOK 217.92, we obtain a cash-use at point of sale of NOK 62.1 billion. This implies that the cash and card payments at point of sale had a combined value of NOK 432.1 billion (see Table 1 and chapter 6 for explanations).

## Household consumption estimate of cash payments

In Gresvik and Haare (2008a), we made an alternative calculation[16] of the cash and card use at point of sale in Norway for 2007. The alternative calculation was based on information from the national accounts and showed the household consumption at point of sale to be NOK 595 billion[17]. The higher level of point of sale consumption gives a correspondingly higher value of cash use[18] at point of sale (NOK 227.7 billion; 3.7 times higher than the survey based estimate).

Our estimate on the number of cash transactions based on the value of cash payments from the alternative calculation is 1045.1 million transactions (this is calculated by dividing the cash payments value of NOK 227.7 billon by the average cash payment value from the household survey of NOK 217.92) In table 9 this is shown[19].

[16] In Gresvik and Haare (2008a) the alternative calculation was elaborated as the "maximum value of cash used at point of sale". To estimate the "maximum value" of cash use at point of sale, the value of bill payments (giros, retail market), card payments and personal cheques were deducted from the household consumption calculated by Statistics Norway. The resulting value is higher than the actual value of cash payments at point of sale in Norway, as it is also possible to make payments by other instruments besides cash at point of sale (e-money schemes, chain-store specific payment cards etc). We do not know how much these other instruments (besides cash) cover household consumption at point of sale.

[17] Household consumption was NOK 872.4 billion, our calculation gave an estimate of non point of sale consumption to be NOK 277 billion in 2007.

[18] Note that "cash use" also include other settlement means. It is likely that part of this "cash use" is settled using e-money, giro (deposit money) or direct account-to-account transfers.

[19] Note that the household consumption value is NOK 597.7 in table 9, slightly more than the original estimate of household consumption value at point of sale. This is due to differences in the statistics on card payments.

**Table 9:** Value and number of transactions at point of sale, (household consumption estimate of cash payments)

| 2007 Base: Residents | Transactions millions | per cent | Value NOK billions | per cent |
|---|---|---|---|---|
| Point of sale, total | **1969.1** | **100.0 %** | **597.7** | **100.0 %** |
| Cash usage | **1045.1** | **53.1 %** | **227.7** | **38.1 %** |
| Card usage, total | 924.0 | 46.9 % | 370.0 | 61.9 % |
| BankAxept | 805.3 | 40.9 % | 298.1 | 49.9 % |
| Petrol companies' cards | 21.6 | 1.1 % | 10.8 | 1.8 % |
| Visa, MasterCard, Amex, Diners Club | 97.1 | 4.9 % | 61.0 | 10.2 % |

(bold figures deviate from the household survey calculation in Table 1)

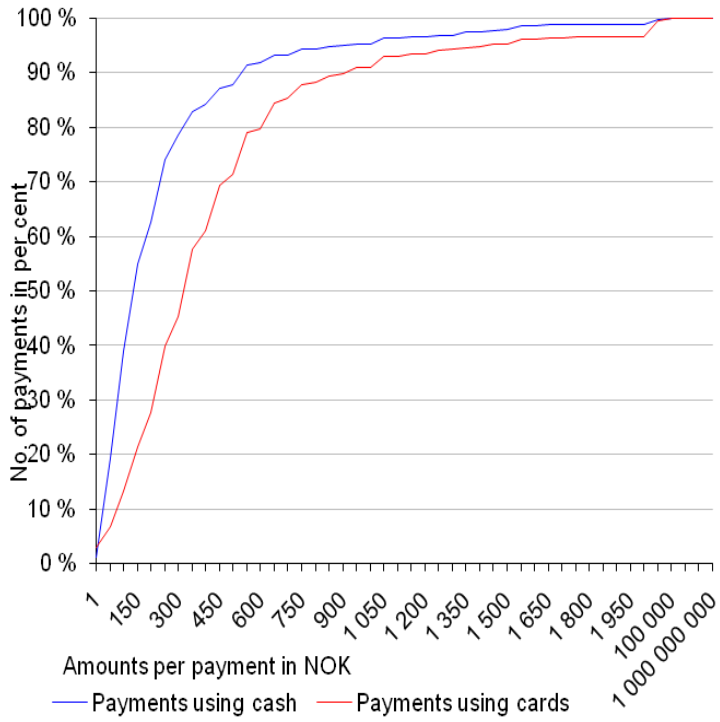
When using this method the value of the cash transactions rises from 14 to 38 per cent, and the value from 24 to 53 per cent.

## Important elements for an evaluation of the two calculations

The estimates of cash payments made above are simple, and ignore information that can be important. Some information support the calculations, but there are also some anomalies to consider:

- Surveys conducted by The Norwegian Saving Banks Association (Sparebankforeningen) and BBS (a supplier of electronic, payment- and information solutions) give support to our cash estimate (a low and decreasing cash-use), see chapter 5.
- Cash payments estimate in the merchant survey offer some support to the household survey cash estimations.
- Is the methodology in the household survey calculation reliable? Jonker and Kosse (2009) show that people often forget small cash payments very quickly. A diary where they write down their payments as they occur could be a better method. Information from BBS indicates that the household survey underestimates the number of low-value card transactions. This might also be true to cash transactions.
    - The responses in the household survey show that a considerable number of payments have low value (39 per cent of cash payments were of less than NOK 100 in value). Cash payments are generally of lower value than card payments, see Illustration 4.

# Illustration 4: Payments by cash and card, household survey




- The household survey covered Norwegians 16 years old and above. Transactions made by children are not covered by the survey.
    - Children and younger teenagers mostly pay by cash. We believe that their cash payments usually are of low value. This indicate that the survey underestimate the number of cash payments and over-estimate the average value. We believe this effect is moderate.
- A cash use at point-of-sale amounting to NOK 62.1 billion is only about 50 % of what is withdrawn from Norwegians ATMs (where NOK 1000 notes are not included).
    - It is likely that some of the cash withdrawals are spent on hoarding and unregistered activities. If the grey economy amounts to 10 % of GDP (ca NOK 227 billion) it is likely that most of these payments are made in cash. Gresvik and Kaloudis (2001) showed that a rather large stock of cash is needed to cover the needs in the grey and illegal economy. However, our estimate of cash payments still seems low compared to the value of the cash withdrawals.

    - If we assume that withdrawals of 1000-NOK notes are the same as deposits of 1000-NOK notes in Norges Bank, approximately 14 billion NOK in 2007, the anomaly is strengthened further.
- NOK 208 billion was deposited in Norges Bank and private cash depots in 2007. It can be expected that each note / coin was used in several payments[20] while they were in circulation outside the central bank or cash depot. The deposited cash also include currency exchanges and cash from the unregistered sector of the economy, and should thus be expected to be higher than the results from the household survey.
    - Again, hoarding and grey/illegal activities might explain some of this. But the mismatch is so large that the estimate on number of cash payments should be used with caution.
- The estimate for number of transactions in the household consumption calculation is based on the average value of cash transactions from the household survey. Household consumption data does not show number of payments. If it is true that the respondents tend to forget small-value transactions, the average cash payment value should be lower, in effect raising the estimate of transactions in the alternative calculation. Sensitivities are shown in table 10.

**Table 10:** Cash payments estimate: sensitivity to average value

| Value of cash payments (NOK billions) | 227.7 | | | |
|---|---|---|---|---|
| Average value (NOK) | 217.92 | 200.00 | 150.00 | 100.00 |
| Number of cash payments (millions) | 1045.1 | 1138.7 | 1518.3 | 2277.5 |
| In per cent of number of payments at point of sale | 53.1 % | 55.2 % | 62.2 % | 71.1 % |

The anomalies and contradictory data to our estimate of cash payments at point of sale raise the question whether the calculation based on the household survey is correct. In our opinion, this the use of cash payments and the use of cash for hoarding and illegal activities should be investigated further.

[20] It is also to be expected that cash used in the black/grey sector of the economy has done one or more loops in the payment chain before the last payment laundering the cash.

## Household consumption estimate: The effect on social cost

We have also made a calculation to show what happens when we apply the results in table 9 to the survey average transaction value (re-calculating table 7). Assuming that the social cost per transaction is the same, regardless of number of transactions, we have estimated a new social cost to the society. The results are shown in table 11:

**Table 11:** Social cost for some instruments, (Household consumption estimate of cash payments)

| | Social cost | No. of transactions | Value (NOK) | Social cost per transaction | Social cost per krone |
|---|---|---|---|---|---|
| | NOK millions | Millions | NOK billions | NOK | in øre per NOK |
| **Cash, total** | **4865.1** | **1177.1** | **346.8** | **4.13** | **1.40** |
| ATM | 1 296.8 | 98.5 | 119.1 | 13.17 | 1.09 |
| Other deposits and withdrawals | 1 682.1 | 33.5 | 0.0 | 50.21 | 0.00 |
| **Cash payments** | **1 886.1** | **1 045.1** | **227.7** | 1.80 | **0.83** |
| Cards, total | 5 355.9 | 902.4 | 359.1 | 5.93 | 1.49 |
| Giro, total | 2 308.5 | 510.7 | 10 428.8 | 4.52 | 0.02 |
| **Sum society** | **12 529.5** | **2 590.2** | **11 134.7** | **4.84** | **0.113** |
| **Sum POS (cash and cards)** | **10 221.0** | **2 079.5** | **705.9** | **4.92** | **1.448** |

(bold figures are different from the original calculation in Table 7)
(1 NOK = 100 øre)

The effect of increased cash costs is moderate to the social cost level. Measured as a ratio of GDP, the costs increases from 0.49% to 0.55 % of GDP (based on cash and cards only, the increase in the ratio is from 0.39 % to 0.45 % of GDP). One should remember that the cost of cash distribution services is unaffected by the increased number of payments in Table 11, as explained above.

## Comparing 1993 and 2007 numbers of transactions

In 1993, a household survey was conducted by Norges Bank. Based on data from the survey, an estimate of cash use at point of sale was made (NOK 231.9 billion, 1258.1 million payments). An alternative calculation of cash use based on household consumption in 1993 was made as well (results: NOK 229.7, 1246.3 million payments, see table 12). The calculation of cash use at point of sale for 1993 was basically same as for 2007.

**Table 12:** Household surveys in 1993 and 2007

| | Transactions | | | | Value | | | |
|---|---|---|---|---|---|---|---|---|
| | 1993 | | 2007 | | 1993 | | 2007 | |
| | Million transactions | Per cent | Million transactions | Per cent | NOK billion | Per cent | NOK billion | Per cent |
| Cash | 1258.1 | 84.5 | 285.0 | 23.6 | 231.9 | 74.6 % | 62.1 | 14.4 |
| Cards | 191.8 | 12.9 | 924.0 | 76.4 | 62.6 | 20.1 % | 369.9 | 85.6 |
| Cheques | 38.4 | 2.6 | - | - | 16.4 | 5.3 % | - | - |

Developments in the relative value of payments at point of sale using different payment instruments are shown in illustration 5. Illustration 5 show values based on household consumption data (the data used in the alternative calculation).

## Illustration 5: Use of different payment instruments, value in per cent

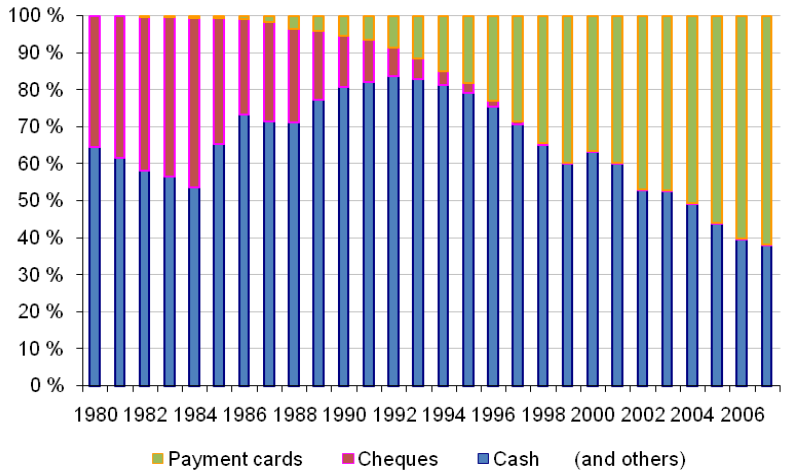
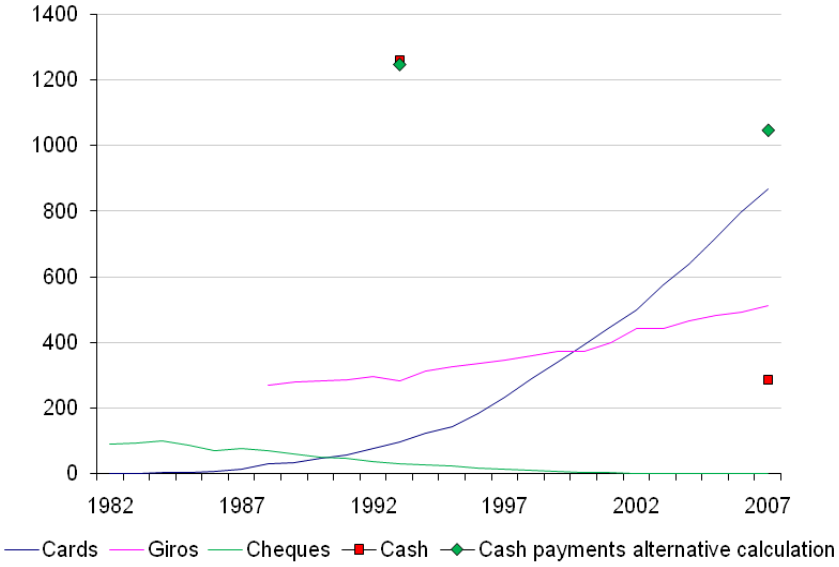



Illustration 6 shows the household survey- and alternative calculations for 1993 and 2007 in combination with statistics on card, cheque and giro use. Statistics on card and cheque payments are used in both the household survey and the alternative calculation.

## Illustration 6: Use of different payment instruments, value in per cent




In 1993 calculations based on the household survey and the household consumption gave approximately the same number of cash transactions. This is not so in 2007. The two alternative calculations estimate cash use at point of sale to be 24 per cent or 53 per cent of payment using cash. We have no explanation to why the range is so wide in 2007. As shown in table 11 versus table 7 the effect on costs are small. As this analysis focus on costs, we did not probe further into this problem. This might be a topic for further studies.

# 4 Costs in banks in Norway: 2007 and development over time

## Process

The initial invitation to participate in the survey was sent to 24 banks and 2 card acquiring companies in October 2006. Questionnaire and spreadsheets were distributed in December 2006, giving the participating banks the whole of 2007 to collect data. A full year was considered necessary to obtain sufficient quality of data (as use of payment services fluctuate throughout the year, and as some databases are revised by end-year). 12 banks and one card acquiring company responded in Q1 and Q2 2008. Based on the information we received, it was decided that only data from banks could be published. Further details of the process are described in Appendix to chapter 4.

## Assumptions

Private costs for payment and cash services in banks are calculated as:

$$\sum_{i=0}^{n}(Weighted\ average\ private\ unit\ cost\ \times number\ of\ transactions\ in\ society)$$

for each *(i)* of the *n* services offered by the banks that responded to the survey. To calculate the weighted average unit cost, the sum of costs and sum of transactions from the 12 banks were used:

$$Weighted\ average\ private\ unit\ cost\ for\ service\ n = \frac{\sum private\ unit\ cost\ for\ service\ n}{\sum transactions\ for\ service\ n}$$

These calculations were done under the assumption that the 12 banks are representative for the banking industry in Norway, and that the calculation of full cost using the ABC-framework (see below) give a detailed estimate of the costs in each bank. Assumptions are elaborated further in Appendix to chapter 4.

## Methodology

The survey of costs in banks covers all banks' costs in producing payment and cash handling services. The survey was constructed in order to calculate the full cost for producing cash and payment services, based on an Activity Based Costing (ABC) methodology, both for each bank as a whole, and for each service the individual bank offered.

The full cost is defined as the private cost in the banking industry, and includes own production cost and costs of deliveries from subcontractors. The full cost consists of direct costs and indirect costs, where direct costs are costs that are directly attributed to the service from subcontractors and activities unique for the individual service offered, while indirect costs are costs generated by in-house activities that are common across the bank (support functions). The full cost can also be decomposed into variable and fixed costs, but this distinction is not elaborated in the survey.

Descriptions of the ABC method can be found in Cooper and Kaplan (1999), Bjørnenak (1993) and Sti (1993). The ABC method bases its cost distribution on activities, not cost centers. Activities generate costs, and a higher activity level (larger size of the cost driver) increases costs. Costs are distributed to the different products/services produced based on importance of the product/service (size of the cost driver). In this analysis, important cost drivers are the number of payment transactions and the number of deposits/withdrawals.

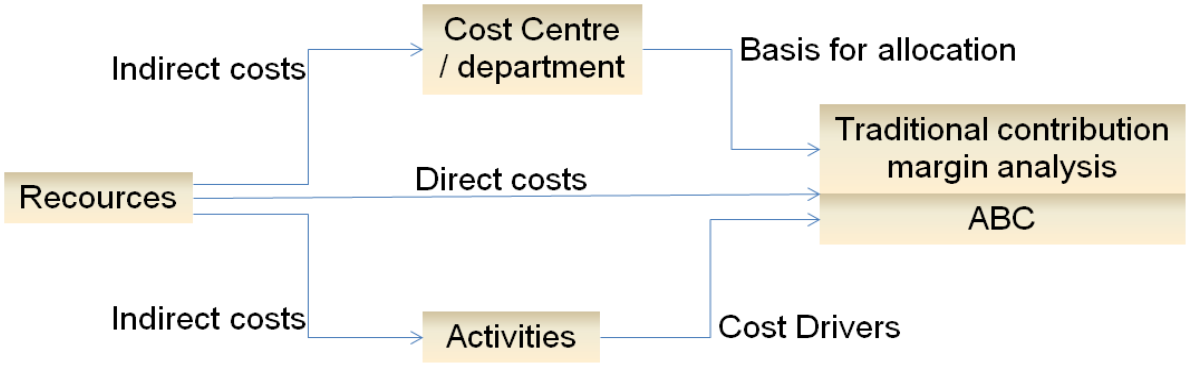
Costs are distributed through activities and cost drivers to indirect costs and direct costs. A list of the activities in this survey is shown in Appendix to this chapter.

The ABC-method is particularly suited in cases where support functions' share of total costs is high and rising over time, and/or where there is wide variation in products, services, customers and production processes[21]. Banks' production of payment services is characterised both by support functions that generate a large proportion of the total costs and wide variation in how the services are produced, and hence also wide variations on the level of costs allocated to each service.

Costs are generated by the resources the banks use to produce their products and services. The resources are labour, machinery and other facilities necessary in the production. As illustration 7 shows, the allocation of direct costs is similar in the contribution margin analysis and in the ABC-analysis. The methods differ in how indirect costs are allocated.

[21] Cooper and Kaplan refer to the so-called "Willie Sutton Rule" where it is advised to look for areas with large indirect expenses in support functions and "The High Diversity Rule" advising to look for situations where there are large variety in products, services, customers etc.

## Illustration 7: ABC analysis and contribution margin analysis

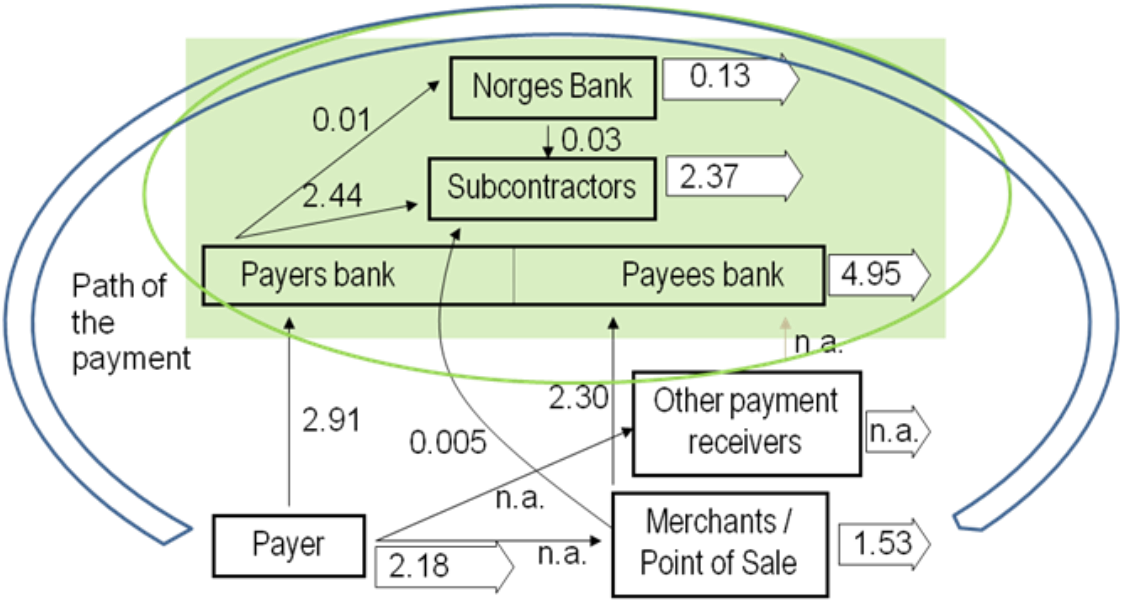



Source: Bjørnenak (1993)

In the analysis of the banks' costs in producing payment services, the participating banks provided and processed the requested information in a specific framework. Those banks which already used an ABC-framework for payment services adjusted their existing method to fit our framework. This did not affect the results in our survey adversely.

The bank survey covered the shaded area in illustration 8:

## Illustration 8: The bank survey



# Results

## Total private cost

The banks' total private cost of producing payment and cash handling services in 2007 was NOK 7.4 billion. Cost of holding cash, the seigniorage cost, was NOK 0.15 billion, resulting in a total cost of NOK 7.5 billion. In this chapter, we generally discuss private costs excluding seigniorage.

As shown in Chapter 2, private cost is defined as the sum of own production cost and subcontractor costs. Table 13 maps the own production cost and subcontractor cost per instrument for banks only:

**Table 13:** Banks' private costs 2007: different elements

| | NOK billions | Million transactions |
|---|---|---|
| **All services, private cost *a*+*b*+*c*** | **7.39** | **1545.14** |
| **Cash services, private cost *a*** | **2.19** | **132.00** |
| Cash services, own production cost | 1.72 | 132.00 |
| Cash services, subcontractors cost | 0.48 | 132.00 |
| **Card services, private cost *b*** | **3.39** | **902.44** |
| Card services, own production cost | 1.77 | 902.44 |
| Card services, subcontractors costs | 1.61 | 902.44 |
| **Giro services, private cost *c*** | **1.81** | **510.70** |
| Giro services, own production cost | 1.46 | 510.70 |
| Giro services, subcontractors' costs | 0.35 | 510.70 |

Banks' private cost is calculated by multiplying the weighted average unit private cost of the 12 banks in the survey by the number of domestic transactions for each service. The sum of private unit costs at all banks is somewhat higher than the costs for all banks. This is due to the elimination of interchange fees, which affect some of the ATM, giro and card services. Sum of private costs for banks in Norway, is calculated exclusive of interchange fees, as the fees paid by some banks are fees received by other banks.

## Deposit services and cash services

The NOK 7.4 billion private cost originate from different services. One of the basic distinctions that can be made is between costs generated by deposit services and by cash

services. Deposit services are services that move deposits from account to account, that is: payment transactions. Cash services are services that transform deposits to cash or cash to deposits (withdrawals and deposits). Costs from producing deposit services are NOK 5.2 billion, while costs from producing cash services are NOK 2.2 billion (see table 14).

**Table 14:** Banks private costs 2007: deposit and cash services

| | NOK billions | Billion transactions |
|---|---|---|
| All services | 7.39 | 1.55 |
| Deposit services | 5.19 | 1.41 |
| Cash services | 2.19 | 0.13 |

## Cost coverage

As mentioned in Chapter 2, banks' income is registered in the ORBOF statistics. Income from payment services was NOK 5.2 billion in 2007. This gave an overall cost coverage of 71 %. Using the same distinction between cash and deposit services, where cash services include ATM services, gives cost coverage of 88 % and 27 % of deposit and cash services, respectively (table 15). This is based on the calculation shown in the Appendix to chapter 2. If ATM is considered to be a deposit service (as in prior Norwegian cost surveys), the cost coverage will be 87% (deposits) and 0 % (cash).

**Table 15:** Banks private costs: cost coverage 2007

| | Costs, NOK billions | Income, NOK billions | Cost Coverage, per cent |
|---|---|---|---|
| All services | 7.39 | 5.21 | 71 % |
| Deposit services | 5.19 | 4.62 | 88 % |
| Card services | 3.39 | 2.08 | 61% |
| Giro services | 1.81 | 2.53 | 140% |
| Cash services | 2.19 | 0.59 | 27 % |

Table 15 shows that the cost coverage varies considerably between the different payment services[22]. Giro costs are more than covered.

In addition to income from direct pricing, banks have other income that can be assigned to payments. It is common for banks to offer a lower interest rate on payments accounts than on savings accounts, very often a rate close to nil. As salaries are commonly paid to payments accounts, the money does not pay the account holder much interest. However, the money is accessible to banks, which in principle can re-invest them and earn a higher

[22] The information in Table 15 can also be found in Tables 4, 5 and 6

interest rate than what is offered to the account holder. This creates an interest margin income that is attributable to payments, and would most likely be so large that it would turn the payment services loss into profit.

In this paper we do not estimate such income, as it is less precise than what can be attributed directly from prices and fees on payments.

### Private unit cost

For each of the 26 services in the banking survey we have calculated the weighted average of each banks private unit cost. This is, as mentioned above, the basis for calculating the private costs for the banking industry. The private unit costs are shown in Table 16:

**Table 16:** Banks private costs: unit costs 2007

| Costs are rounded to the nearest 50 øre, fees are rounded to the nearest 10 øre. | NOK | Calculated interchange fee (NOK) |
|---|---|---|
| Telephone giro | 2.50 | 0.20 |
| Internet Banking – solutions for private customers | 2.00 | 0.10 |
| Internet Banking – solutions for corporate customers | 2.00 | 0.10 |
| Direct debits (Avtalegiro) | 2.50 | 0.20 |
| Remittance / company terminal giro (CID / notified and unnotified) | 4.50 | 0.40 |
| Mail giros | 7.00 | 0.20 |
| Giro, account debits or cash payments | 30.50 | 0.10 |
| Direct remittance / company terminal giro sent as a money order and or by Internet banking services | 29.50 | 0.70 |
| BankAxept (issuer) | 1.00 | 0.10 |
| International debit cards (issuer) | 3.50 | 0.10 |
| International credit cards (issuer) | 2.50 | 0.60 |
| BankAxept (acquirer) | 1.50 | 0.00 |
| Debit cards issued by international card companies (acquirer) | 3.50 | 0.00 |
| Credit cards issued by international card companies (acquirer) | 32.50 | 0.00 |
| Transfers | 0.50 | 0.00 |
| Deposits at the counter | 61.50 | 0.10 |
| Night safe | 43.50 | 0.00 |
| Deposits through cash handling companies | 11.50 | 0.00 |
| Deposits: Coins (bag, bulk) | 9.50 | 0.00 |
| Deposits through automats | 30.50 | 0.00 |
| Cash withdrawals at the counter | 38.50 | 0.00 |
| Cash withdrawals at own banks ATM own customers | 7.00 | 0.00 |
| Cash withdrawals at own banks ATM foreign customers | 6.00 | 0.00 |
| Cash withdrawals at own banks ATM international cards | 11.50 | 0.00 |
| Cash withdrawals at foreign banks ATM own customers | 8.50 | 6.90 |
| Coin roll deposit | 9.50 | 0.00 |

Note that card use in Norway is mainly debit card based. Credit cards cover only a small fraction of the total number of card transactions. Furthermore, banks are not the main

international payment card acquirers, two card acquirers[23] (Teller and Elavon) dominate the market in Norway. The data from acquirers are not published in this analysis. Those two effects lead to a private unit cost for international credit card acquiring that is not representative for card acquiring in Norway, only for the limited activity by banks in this area.

### Unit cost versus price

Norges Bank has promoted the view that relative prices for banks' services should reflect the relative costs of producing the services. Given a price signal that reflects the real use of resources, customers should be able to choose the most efficient services for their payments. Examples in Table 17 show that relative prices reflect relative costs.

**Table 17:** Unit costs and listed unit prices for some services

| Instrument | Unit cost (NOK) | Price[24] (NOK) | Unit cost / Price |
|---|---|---|---|
| Telephone giro | 2.50 | 2.23 | 1,12 |
| Internet Banking – solutions for private customers | 2.00 | 2.04 | 0.98 |
| Internet Banking – solutions for corporate customers | 2.00 | 1.95 | 1.03 |
| Direct debits (Avtalegiro) | 2.50 | 2.07 | 1.21 |
| Remittance / company terminal giro (CID / notified and unnotified) | 4.50 | 2.51 | 1.79 |
| Mail giro | 7.00 | 6.87 | 1.02 |
| Giro, account debits or cash payments | 30.50 | 30.06 | 1.01 |

## Costs: Further results

### Cash and deposits

As shown above, costs of producing 132 million cash deposits / withdrawals were NOK 2.2 billion, while production cost of 1413 million cards and giro transactions were NOK 5.2 billions. These numbers are aggregated, and they can be decomposed in different ways.

Banks offer a wide range of services for accessing cash and depositing cash. Cash channels to/from banks customers are the ATM network, branches and cash handling depots. Corporate customers mainly use bulk services, while retail customers mainly use ATMs and

[23] In Norway this kind of activity is regulated in the Act on Financing Activity and Financial Institutions (1988).
[24] Listed prices as quoted in Norges Banks Annual Report on Payment Systems. Note that listed prices does not show the effect of discounts through product packages in the banks. The prices each customer face is therefore likely to be 30- 90 % lower.

branches for withdrawals and depositing of cash. The range of services is shown in Table 16 above. These services can be grouped into four main activities, as shown in table 18:

**Table 18:** Banks Private costs: Cash services

| | NOK billions | Million transactions |
|---|---|---|
| **Cash services, total** | **2.19** | **132.00** |
| Manual services | 1.37 | 30.08 |
| Automated / electronic services | 0.83 | 101.92 |
| Hereof: ATM services | 0.76 | 98.50 |
| Deposit services | 0.81 | 16.84 |
| Withdrawal services (incl. ATMs) | 1.38 | 115.16 |

A distinction should be made between manually based services and automated services. Over the years several services have been gradually automated. As table 15 shows, few transactions are handled manually in banks, but it is important to remember that the automated services need man-power to deliver: ATMs and other automats have to be re-filled, serviced etc.

The manually based depositing services handle larger values in each transaction than withdrawal services, as they are normally used by corporate customers. As a consequence, they are more expensive per transaction than withdrawals. The value of these services is also likely to be higher to both customers and to banks. Depositing services are gradually becoming more automated, catching up with the heavily automated withdrawal services. Cost structure is somewhat different, as deposit services mainly generate activities and costs within the bank (in branches), while withdrawal services are more dependent on banks' subcontractors.

Payment services that access deposits, or that move deposits from the payers' account to the payees' account, are mainly card services and giro services. Card payments are mainly made at point of sale or over the internet, while giro payments are made to settle bills. Both card payments and giro payments are mostly done in an all-electronic process, (straight-through-processing), and even when the payment itself is initiated on a paper slip, they normally turn electronic when a bank receive the payment instruction. Giro payments tend to be of larger value per transaction than card payments. There has been a large increase in the number of card transactions the last years, as cards are replacing cash as payment instrument at point of sale.

Both cards and giros can be split into several different schemes, and the sum of transactions and costs are shown in table 19.

| **Table 19:** Banks Private costs: deposit services | | |
|---|---|---|
| | NOK billions | Million transactions |
| All deposit services | 5.19 | 1413.00 |
| Card services | 3.39 | 902.40 |
| Giro services (incl transfers) | 1.81 | 510.60 |

## Card and giro services

Card payments can also be made using credit (not deposits) as a means of payment. This is included in the cost-calculation of "deposit services". When the private costs of cards-calculation is disaggregated, it is useful to have a look at debit card services and credit card services, which shows that even though the use of credit cards are low in Norway, the per-transaction production costs are substantial for the banks. The reason for this is mainly that banks cover a small market share, especially in acquiring credit cards. The biggest acquiring agents are Elavon Merchant Services and Teller, and the results from these[25] are not published. However, it is likely that the unit cost would be lower if they were included, as there are economies of scale in acquiring card transactions.

Another interesting split is BankAxept versus other brands, as BankAxept is by far the most widely used scheme in Norway. The effect of economies of scale is clearly shown in Table 20.

| **Table 20:** Banks Private costs: card services | | |
|---|---|---|
| | NOK billions | Million transactions |
| **Card services, total** | **3.39** | **902.40** |
| Debit card services | 2.41 | 874.34 |
| Credit card services | 0.97 | 28.06 |
| BankAxept services | 1.93 | 805.30 |
| International cards services | 1.46 | 97.10 |
| Issuing cards services | 2.27 | 902.40 |
| Acquiring card services | 1.12 | 902.80[26] |

[25] Elavon Merchant Services answered the survey, but not Teller. Due to anonymity reasons, data from Elavon is not published.

[26] We use number of card transactions on the issuing side (902.4 million transactions) in this paper as a rule, since the Norges Banks Annual Report on Payment Systems give very accurate statistics on the issuing side but less so on the acquiring side. However, based on information on the issuing side on the distribution between payments made by residents and non-residents made by international debit and credit cards, an estimate of the number of transactions on the acquiring side was made (902.8 million transactions).

Giro schemes handle the bulk of bill payments in Norway. Strictly speaking, a giro is only a yellow paper bill payment instruction, but most of the bill payment services are named giro services, even if they are fully electronic and the form to be filled in often do not resemble the yellow paper slip. As the move to fully electronic services is close to complete, the bulk of the costs are carried by these (internet giro etc.). One should note that the unit cost of producing the electronic services is much lower than for the paper based ones. As Table 21 shows, most giros are fully electronic, and the bulk of payments go through the Internet banking solutions.

**Table 21:** Banks Private costs: giro services

| | NOK billions | Million transactions |
|---|---|---|
| **Giro services, total (a+b+c, or c+d+e)** | **1.81** | **510.60** |
| Electronic Giro (a) | 1.01 | 428.40 |
| *Hereof: Internet Giro* | *0.64* | *318.80* |
| Paper based Giro (b) | 0.77 | 48.40 |
| *Hereof: Giro mail (Brevgiro)* | *0.19* | *29.00* |
| *Giro Over The Counter (paid cash and deposited to account)* | *0.53* | *17.70* |
| Transfers (c) | 0.02 | 33.80 |
| Credit transfers (d) | 1.65 | 427.20 |
| Direct Debits (Avtalegiro) (e) | 0.13 | 49.60 |

The services described in Table 20 and 21 can also be split in electronic/automated versus manual/paper-based:

**Table 22:** Banks private cost: Electronic / automated and paper-based / manual services

| | NOK billions | Million transactions |
|---|---|---|
| Electronic / automated services | 5.25 | 1466.5 |
| Paper-based / manual services | 2.14 | 78.5 |

The paper-based/manual services in Table 22 are the sum of manual cash services and paper-based Giro services. The electronic/automated services are the rest of the services. As we can see, the manual/paper based services are not much used anymore, and the bulk of transactions and costs are carried by the automated/electronic services.

### Resource use compared to total resource use in the banks

There are similarities and differences between the cost structure of cash, card and giro. The differences stem from the degree of manual handling or electronification, but also from the differences in infrastructure and number of transactions in the banks.

The use of subcontractors is extensive for the three main groups of instruments. According to our calculations, 6.6% of banks' non-financial costs[27] are generated from the use of payment system subcontractors. The services from the subcontractors differ, of course, but data processing centrals and cash handling firms are used by all banks. All banks also participate in common solutions, like the BankAxept and Giro solutions, so they all face interchange fees and invoices for production of the payment services. Thus the element of direct cost is quite substantial in all services.

Of non-financial costs in banks, 15.4% are generated by payment services activities, and 5.4 % by cash handling activities. Fraud and counterfeit is a cost to banks, as they guarantee settlement for card transactions, and since they have better equipment to identify counterfeited notes than the merchants. Because of the characteristics of the domestic card system BankAxept (online, PIN-based debit card system) and due to Norwegian kroner being a small currency not heavily used abroad, fraud is rare and counterfeiting is at a very low level. The cost to the banks of fraud and counterfeit is thus only 0.07% of their total private cost.

Payments are very hardware/software intensive, while cash handling is more labour intensive. The banks in our survey spend 10 % of their FTE (Full-Time Equivalent) labour on handling payments, and 3% of their man-years to handle cash deposits and withdrawals. Payments and cash handling is, however, a part of banking that has economies of scale characteristics, so further mechanization /electronification will most likely increase efficiency more than what is the potential in other activities in the banks. Payments and cash handling has traditionally been services with low potential for income, so cost efficiency within this field is vital to banks.

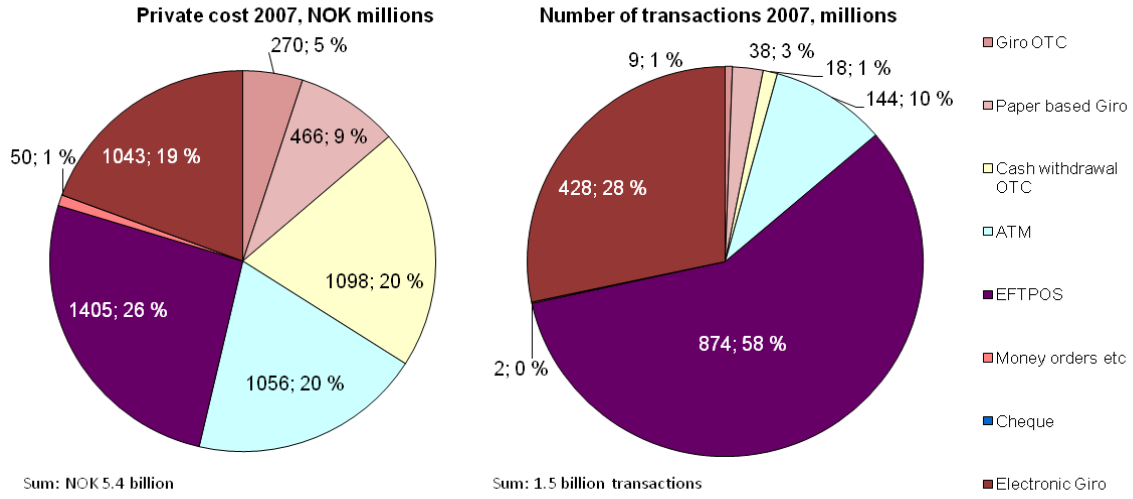
[27] "Non-financial costs" are costs in banks minus interest costs, losses and taxes.

## Prior surveys: comparing results

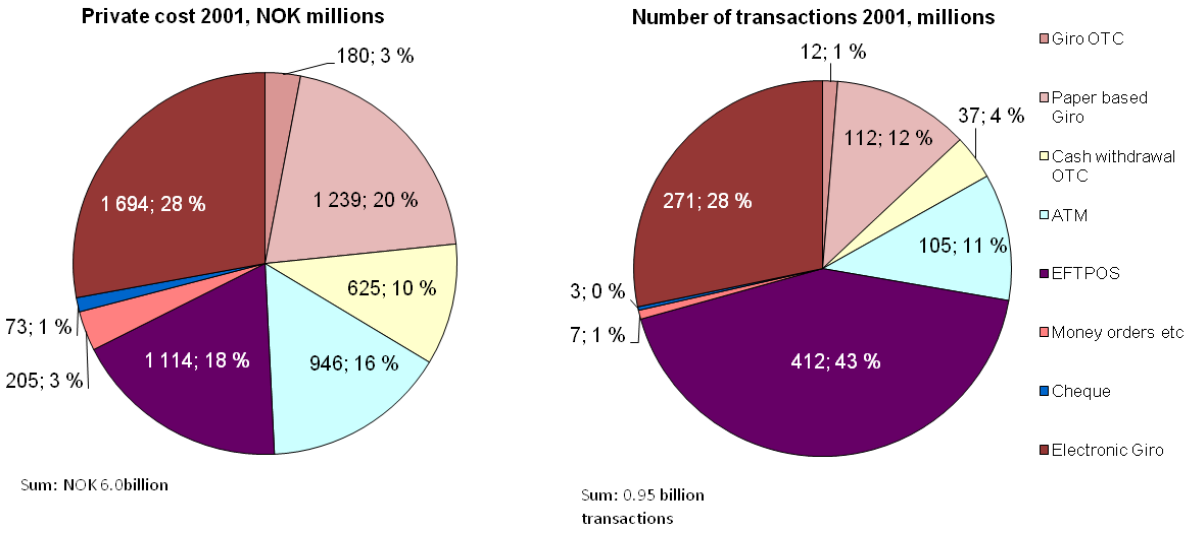
Prior Norwegian surveys of costs in banks considered mostly non-cash services. When comparing costs over time we have distributed the costs on eight services. The eight services cover banks production of the debit card solutions BankAxept and Visa, all giro services, ATM services, and cheques.

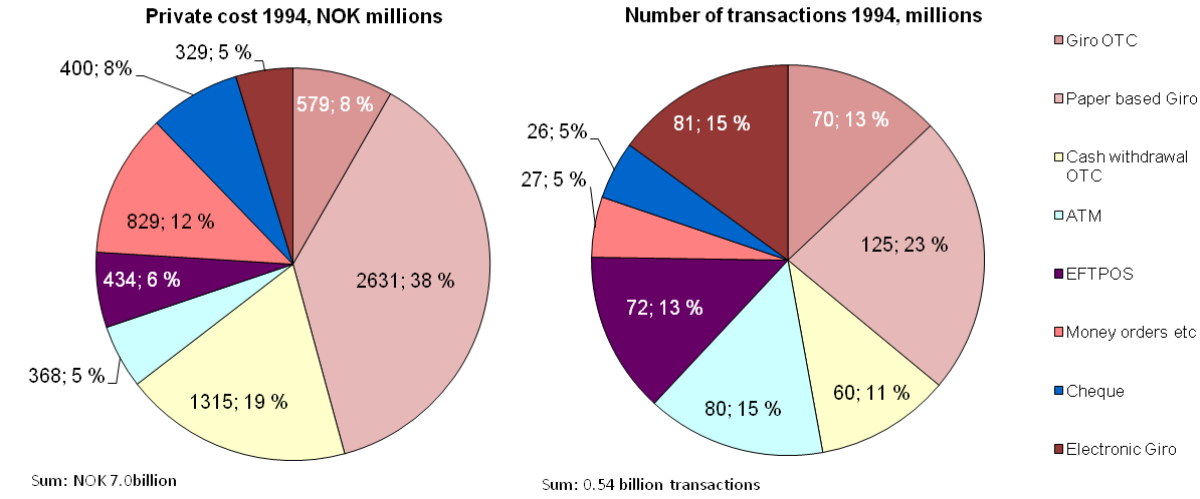
Two trends are noteworthy as regards the cost and transaction picture: Banks' cost is reduced from 1994 to 2007 (in 2007-values, see illustration 9[28]). During the period the number of transactions have almost tripled. The driving force in this development is a shift in services, from paper-based solutions to fully electronic services. What is not shown in the charts below is that the use of cash at point of sale, which has fallen significantly since 1993 (see chapter 5 and Gresvik and Haare 2008a for further details). Banks handle a larger share of payments at point of sale in 2007 than before. Despite the increased activity, they have also managed to reduce their costs over time due to economies of scale and other rationalizations (see Illustration 10 and table 23).

### Illustration 9: Costs and number of transactions in banks: 2007, 2001 and 1994




[28] Note that Transfers and Night Safe is excluded in Illustration 9. The costs and number of transactions are thus somewhat lower than in other illustrations and tables in this section.



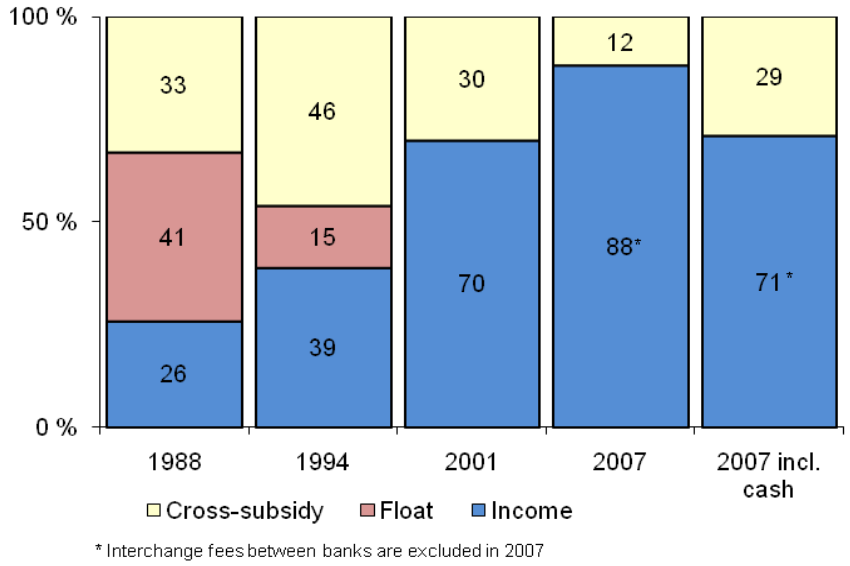




When looking at the development of cost coverage over time, banks have increased their income from payment services relative to the cost incurred by producing the same services. The cost has increasingly been recovered from pricing the different services. The degree of cross-subsidy[29] has thus decreased. This development has been partly due to removal of

[29] Cross-subsidy is when costs generated by one activity are attributed income from another activity. Here, deficit in payment service activities are covered by income from other activities in the banks.

float income, but is also caused by cooperation within the banking industry (cooperation acceptable to the competition authorities).

## Illustration 10: Banks cost recovery on payment services (%)




The banks' income according to the ORBOF statistics can be compared to the income calculated on basis of the listed prices per transaction for payment services. These values deviate, and the main reason is that banks offer discount programs for their trusted customers.

In the bank survey we have not carried out separate calculations on how discounts given in customer product programs affect banks' income compared to using the list prices. However, such calculations were made in the 2006 edition of Norges Banks' Annual Report on Payment Systems. The main conclusions were:

The banks offering discount for ATM withdrawals, give on average a discount of over 85 per cent for withdrawals outside opening hours and for withdrawals from other banks' ATMs.

Relatively few banks included ATM withdrawals from other banks' ATMs in their customer programs. On telephone giros, direct debits and paying bills via the Internet the weighted prices are reduced by more than 50 per cent. On cards it was estimated that on average the prices in customer programs were almost 90 per cent lower than the listed prices. If the prices and transaction volume in the customer programs were taken into consideration, the total average price is 50 per cent lower than the listed price. Very few of the banks offered discounted prices for paper-based services in their customer programs.

## Banks' efficiency and productivity

Reduced cost, increased cost coverage and increased number of transactions point towards the conclusion that banks deliver their services in a more efficient manner in 2007 than what has previously been the case. When calculating the cost to GDP ratio and some other indicators, the conclusion is strengthened (see table 23). The banks produce more services with fewer resources than before; they need fewer branches and fewer employees. The unit costs keep falling. The payment services delivered by banks are more efficiently produced in 2007 than before.

**Table 23:** Bank efficiency indicators

| | 1988 b | 1994 | 2001 | 2007 e | 2007 f |
|---|---|---|---|---|---|
| Private cost (2007-NOK, billions) | 6.0 | 7.0 | 6.6 | 5.4 | 7.4 |
| Private cost as percentage of GDP | 0.59 | 0.61 | 0.38 | 0.24 | 0.33 |
| Private unit cost (2007-NOK) | 15.80 | 12.00 | 5.90 | 4.00 | 4.50 |
| Number of transactions in banks (millions) | 381b | 481 | 968c | 1512 | 1545 |
| Number of branches | 2200 a | 1600 | 1429 | 1260d | 1260 |
| Number of fulltime employees (thousands) | 33 a | 23 | 23 | 20 d | 20 |

a) Rounded b) Withdrawals at the counter are excluded c) All transactions, estimates for services not found in national statistics are included d) Source: The Norwegian Financial Services Association (FNH) e) Same setup as the 2001-survey f) Costs for cash and all costs for cards are included, ordinary 2007-setup.

# 5 Costs at merchants in 2007

## Methodology and process

In 2007-2008, Norges Bank conducted a full-cost survey among merchants on their costs of handling payments. The merchant survey covered cash and cards payments. 147 businesses with 696 outlets responded to the survey, and a separate time study was conducted at eight outlets. Based on the information from the survey and from other sources of information[30], private costs were calculated. Private costs are calculated on the basis of five elements: costs related to infrastructure, amount paid, time spent in the payment process, cash holdings and number of outlets per business.

Unfortunately, the response rate to this survey was not as good as expected, and some of the responses did not meet the expected level of quality. The responses from merchants are skewed, weighted too heavily on grocery chain stores. The effect is (probably) that transaction data will be skewed towards small-value payments, and perhaps towards an overweight of BankAxept payments compared to international card schemes. To compensate for this, information on the use of payment services from the household survey shown in chapter 6 is used as a basis for the calculations in the merchant survey. Statistics on salaries and taxes are based on public statistics. The time study is deemed to be of appropriate quality. The composition of costs (based on the merchant survey responses) is used in the calculations. Furthermore, the fee calculation in chapter 2 based on ORBOF and public statistics from Norges Banks' Annual Report on Payment Systems form the basis for fee and subcontractors' calculations in this chapter.

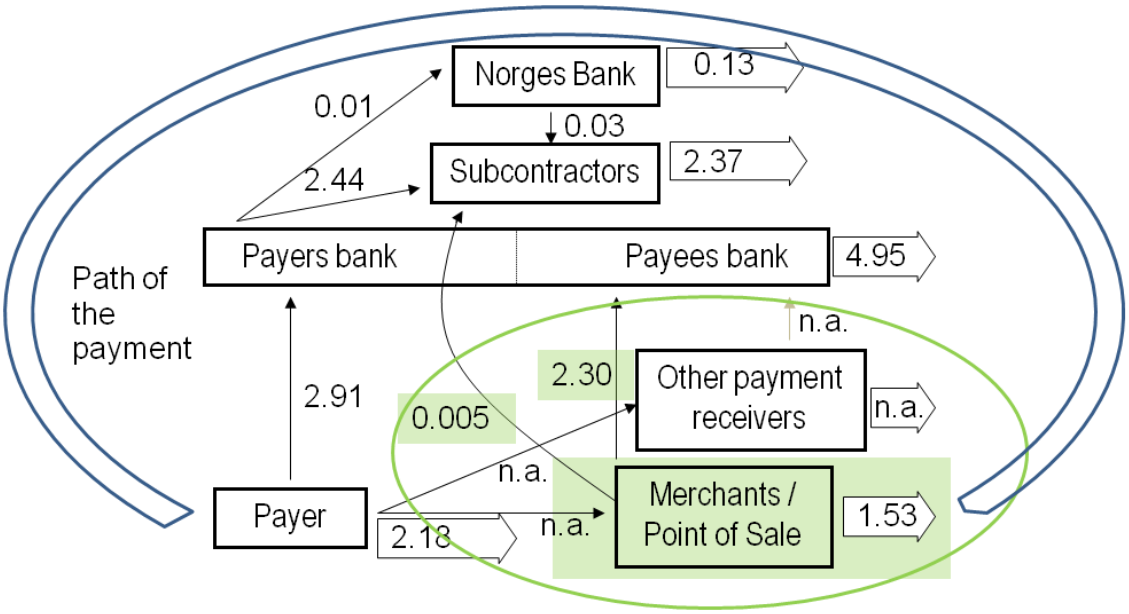
A detailed description of the methodology and the process is found in appendix.

The merchant survey covers the encircled shaded area in illustration 11. Point of sale payments is calculated for merchants and others, where others are other companies (not merchants) and public institutions that can receive payments. Fees paid for bill payments are also calculated for both merchants and others, as shown in appendix to chapter 2, based on information from the ORBOF statistics. The costs calculated for the merchants are based on

[30] Data from Statistics Norway on salaries, from Norges Bank on use of payment instruments and interest rates, and from ORBOF on fees paid to banks for use of payment services.

the survey, and include own production costs and subcontractor costs (fees etc). Others' costs cover only subcontractors' costs (fees).

Illustration 11: The merchant survey




## Results

### Merchants' private costs

Total private costs for merchants and others amount to NOK 3.8 billion. Including seigniorage, merchants' private cost amounts to NOK 4.0 billions. This should be split on merchants and others[31]. Total private costs are shown in Table 24:

[31] Lacking information on others besides ORBOF fees paid, as calculated in appendix chapter 2, one should be aware that the sum of costs in this chapter underestimates the "true" private cost for merchants and others. However, the underestimation is likely to be moderate, as we assume that merchants handle the bulk of the number of payments in question.

| **Table 24:** Merchants private costs 2007: different elements | | | |
|---|---|---|---|
| | Merchants and others, NOK billions | Merchants only, NOK billions | Million transactions[1] |
| **All services, private cost *a+b+c*** | **3.84** | **2.69** | **1474.14** |
| | | | |
| **Cash services, private cost *a*** | **0.32** | **0.32** | **285.00** |
| Cash services, own production cost | 0.32 | 0.32 | 285.00 |
| Cash services, subcontractors' cost | 0.01 | 0.01 | 285.00 |
| | | | |
| **Card services, private cost *b*** | **2.12** | **1.67** | **902.44** |
| Card services, own production cost | 1.22 | 1.22 | 902.44 |
| Card services, subcontractors' costs | 0.90 | 0.45 | 902.44 |
| | | | |
| **Giro services, private cost *c*** | **1.40** | **0.70** | **286.70** |
| Giro services, own production cost | 0.00 | 0.00 | 286.70 |
| Giro services, subcontractors' costs | 1.40 | 0.70 | 286.70 |

[1]According to our calculations, there are 1.19 billion cash and card transactions at point of sale in Norway. We assume that cash transactions at point of sale are handled by merchants only. That is: we assume that "others" do not handle cash. Both merchants and others handle cards and giro payments. We have distributed the number of transactions and costs evenly between them in our calculation. See also chapter 2 for details.

The main part of merchants' own production costs are generated by time spent[32], for instance in the payment operation and handling cash. Examples of subcontractor costs for merchants are rent for payment terminals, telephone lines, and payments for cash handling by specialist firms and banks etc.

### Private unit cost

Calculations of private costs are made by multiplying private unit cost by the number of transactions (Table 25):

| **Table 25:** Merchants cost structure: cash and cards | | | |
|---|---|---|---|
| | Million transactions | Private unit cost (NOK) | Private cost (NOK billions) |
| Total | 1187.40 | | 1.99 |
| Cash | 285.00 | 1.134 | 0.32 |
| BankAxept | 805.34 | 1.077 | 0.87 |
| International card schemes | 97.06 | 8.242 | 0.80 |

Note that in the merchant survey, only cash and cards were investigated. Costs and transaction values for giros are calculated on basis of the Annual Report on Payment

[32] Time spent by employees is a cost to the merchant. According to Statistics Norway, the hourly wages including taxes and social benefits are NOK 230 per hour in Q3 2007. The results from the time study is shown later in this chapter.

Systems statistics and the ORBOF fee statistics. Giros are therefore not included in the unit cost table.

We calculated the merchant private unit costs in Table 26:

**Table 26:** Merchant cost structure: private unit cost

| | Cash | BankAxept | International payment card schemes |
|---|---|---|---|
| | NOK per transaction | NOK per transaction | NOK per transaction |
| **Private unit cost per transaction** | **1.134** | **1.077** | **8.242** |
| Own production cost | 1.116 | 1.070 | 3.668 |
| Subcontractor cost | 0.018 | 0.007 | 4.574 |
| | | | |
| *Different elements of private unit cost per transaction:* | | | |
| *Infrastructure* | *0.034* | *0.011* | *0.077* |
| *Amount paid* | *0.013* | *0.000* | *4.501* |
| *Number of transactions (time spent * salaries etc)* | *1.004* | *1.066* | *3.664* |
| *Cash Holdings* | *0.004* | *0.000* | *0.000* |
| *Number of Outlets* | *0.080* | *0.000* | *0.000* |
| NOK per transaction at Merchants, average | 129.33 | 147.02 | 181.40 |
| Time spent per transaction (seconds) | 15.70 | 16.68 | 57.31 |
| Merchant fee (%, average) | 0 % | 0 % | 2.08 % |

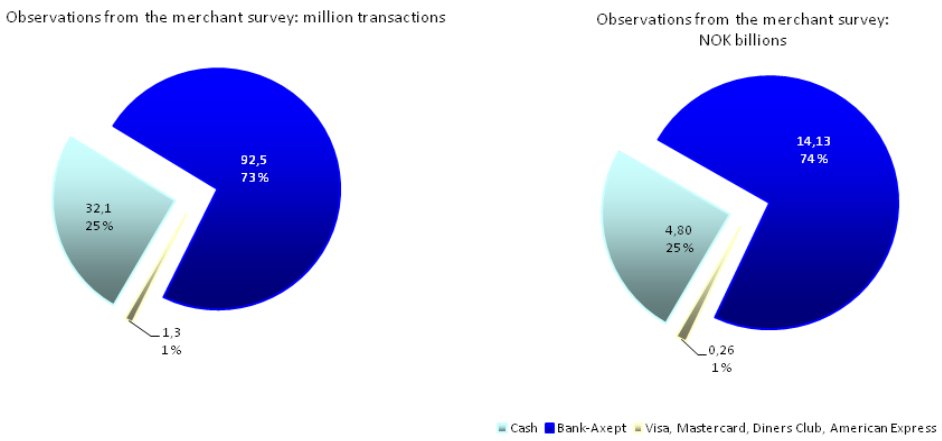
As can be seen in the table, most of the cost is generated by own activity (own production cost) for cash and card transactions. This is mainly the time it takes to process the payment. Also, international card schemes have a considerable amount generated by own activity. Once again, we see that processing time is important. International payment cards mainly depend on signature-technology, which is slower than PIN-technology. As the table shows, subcontractor cost is the largest part of private unit cost for international card schemes, mainly due to the merchant fee, calculated as a percentage of the amount paid.

BankAxept is a very efficient payment solution to merchants. Costs per transaction are low, and do not increase by the value paid, as they do for cash payments and international card payments. The merchants seem to have understood this, and the popularity of the BankAxept scheme is very high – reflected by the widespread use of the scheme.

## Payment instruments used at point of sale

Even though the results from the survey may not be representative, the results are still interesting. Since the sample was skewed towards grocery stores, we expected the use of BankAxept cards to be higher than for the society as a whole. As discussed in Gresvik and Haare (2008a) and in chapter 6, the calculation of transactions based on the household survey in combination with the domestic payment statistics from Norges Banks' Annual Report on Payment Systems 2007 give a good estimate of the "real" use of payment instruments. The results from the merchant survey deviated from the "real" use of payment services in the expected direction. The results from the merchant survey are shown in Illustration 12.

# Illustration 12: Use of cash and cards at merchants




The merchants received 25% of their payments in cash, 1 % by international payment cards, and 74 % was paid by using BankAxept cards. The percentages are the same for the number of transactions and for volume paid. The use of international card schemes is low, since grocery shops are overrepresented in the survey. In Norway most grocery shops do not accept international card schemes. Use of these schemes is more common in buying travel services (transportation and hotels), capital intensive goods or services and in internet-shopping.

## Time spent in the payment operation

Merchants' estimate on time spent on the payment process deviated much from the expected level. A separate time study was therefore conducted in eight outlets. Payment time observations were done in two building material stores, two grocery stores, two restaurants, one hotel and one kiosk in the Oslo area. We consider these outlets to be representative for Norwegian merchants, as they use technology and till systems that are widespread throughout the country. The observations from the time study were in line with the expected level of time spent in the payment process. In table 27 time estimates from the Netherlands and Belgium are also included:

**Table 27:** Time spent paying at point of sale. Seconds per transaction

| | Norway | The Netherlands | Belgium |
|---|---|---|---|
| Cash | 16 | 19 | 32 |
| Debit card | 17 | 26 | 39 |
| International schemes | 57 | 28 | 56 |
| E-purse | - | 14 | 20 |

## Fees on international cards

The merchants were aware of the fees they paid to the international card schemes. The quality of the merchant survey response on this question was good. On the basis of the answers we calculated the average fees on sales value for the different international schemes to be:

**Table 28:** Merchant fees international card schemes

| Scheme | Average fee |
|---|---|
| VISA | 1.78 % |
| MasterCard/EuroCard | 1.86 % |
| Diners Club | 2.51 % |
| American Express | 2.89 % |

These average figures are supported by other observations of fees of international payment cards in Norway (Gresvik et al (2004) and Kaardal et al (2006)).

# 6 Household costs in 2007

## Methodology and process

The survey covered Norwegian households' payment habits. The results from the survey form the basis for estimation of the use of cash at point of sale in Norway, and the results are used in all calculations in this memo. Details of the calculation are shown in Gresvik and Haare (2008a). The number of payment transactions in Norway in 2007 at point of sale (cash and cards) and bill payments (giro) is estimated to be 1.83 billion. Of these, 1.43 billion is made by the households.

To calculate households' payments costs, we used information on salaries[33] from Statistics Norway, and observations and assumptions on the time spent paying, and by making cash deposits and withdrawals. In addition, information on payment fees from ORBOF was used (see chapter 2) to estimate social and private costs of households.

The most important assumptions are:

Time spent: for payments at point of sale we assume that the observations from the time study in the merchant survey are valid also for households. For time spent depositing and withdrawing cash we make assumptions of how much time each transaction requires. The exact number of seconds is stated in the appendix to this chapter.

Salaries: We assume that the cost of spare time is at least as valuable as average hourly wages after tax. It can be argued that this value is higher, since the individual prefer spare time instead of working these hours, but the information to calculate this premium is insufficient. We therefore assume that the minimum value is the valid value of spare time to attribute to time spent paying.

Number of transactions: We assume that the survey gives an accurate response to the number of transactions performed through a year. This is discussed in Gresvik and Haare (2008a). Evidence found in Jonker and Kosse (2008) indicate that the approach used in the household survey might systematically underestimate the number of small-value payments. In lack of better information, we still choose to use the data.

[33] Salary per hour after tax is NOK 154.83 on average for all industries

We have made changes in the data set in the survey. These changes are based on an a priori expectation that was confirmed in the survey results: BankAxept is a poorly recognised brand name, while VISA is a highly recognised brand. Most Norwegians primary payment card is a co-branded card, where BankAxept is the default option, VISA is normally only in use when the cardholder is abroad. The number of VISA transactions in the survey is apparently overestimated by 40 percentage points compared to domestic data, while the number of transactions based on BankAxept cards is underestimated by 38 percentage points.

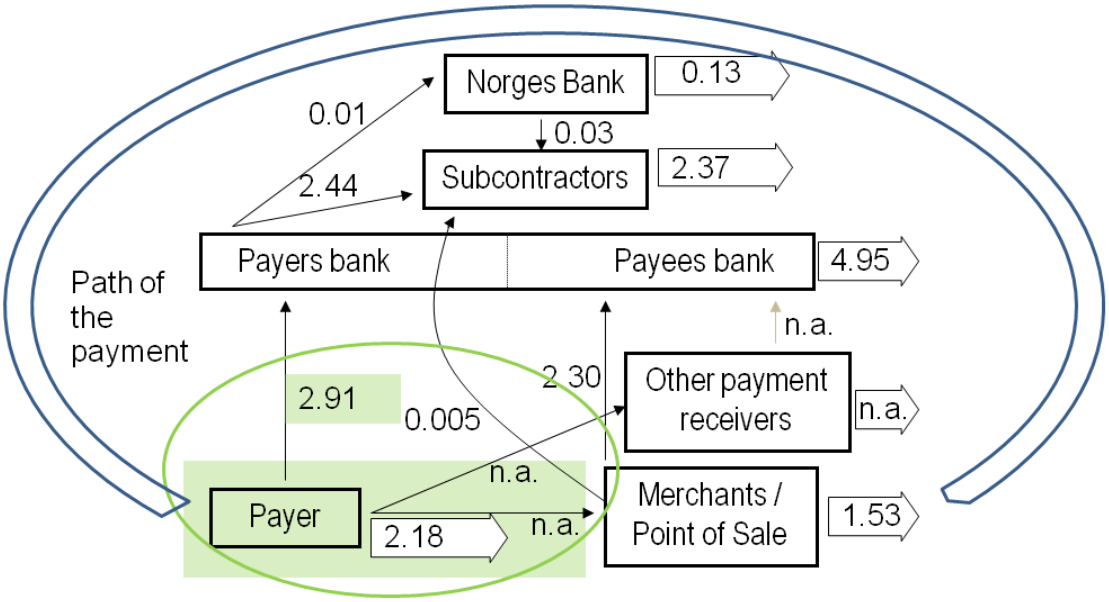
The estimates for time use in the different payment operations are essential for the results. Time used for the different payment instruments have been surveyed separately, but for other activities we have used figures from other surveys (see chapter 7) or data based on our own experience.

The data in this survey was obtained in a market survey carried out by Norstat, a market research company, on Norges Bank's behalf. The sample drawn was representative of the Norwegian population 16 years and older.

Further details can be found in appendix to this chapter.

The costs in the Household survey are encircled in green in illustration 13:

Illustration 13: The household survey



## Results

### Main results on households' payment cost

Households' private costs amount to NOK 5.09 billion. This is:

| | |
|---|---|
| Households' own production cost: | NOK 2.18 billion |
| Fees paid by households: | NOK 2.91 billion |
| = Sum private cost | NOK 5.09 billion |

For the household sector, seigniorage is calculated to be NOK 0.46 billion. It is not shown in Table 29; as it does not affect the social cost[34].

**Table 29:** Households: private costs 2007

| | NOK billions | Million transactions |
|---|---|---|
| **All services' private cost (*a+b+c*)** | **5.09** | **1427.1** |
| **Cash services, private cost (*a*)** | **1.44** | **285.0** |
| Cash services, own production cost | 0.85 | 285.0 |
| Cash services, subcontractors' cost | 0.59 | 285.0 |
| **Card services, private cost (*b*)** | **2.00** | **902.4** |
| Card services, own production cost | 0.82 | 902.4 |
| Card services, subcontractors' costs | 1.18 | 902.4 |
| **Giro services, private cost (c)** | **1.65** | **223.9** |
| Giro services, own production cost | 0.51 | 223.9 |
| Giro services, subcontractors' costs | 1.13 | 223.9 |

Households' own production costs consist of estimated time cost walking to and from ATMs and withdrawing money from the ATM (NOK 0.47 billion), depositing and withdrawing cash at a banks' counter (NOK 0.18 billion) and time spent paying in shops etc (NOK 1.53 billion). The assumptions to this can be found in appendix to this chapter.

The households pay banks fees for use of payment services. The calculation on fees is found in appendix to chapter 4. Own production costs are generated by using different services, and are based on number of transactions and time spent paying /withdrawing / depositing. The results from the calculation are shown in the tables below:

[34] To the households, seignorage cost is (should be) part of the information in which decisions of cash versus deposit use should be made.

| **Table 30:** Households: fees paid by households, distributed on different services | |
|---|---|
| Payment service | Fee (NOK billion) |
| Paper-based giro | 0.34 |
| Electronic giro | 0.34 |
| Cards | 1.78 |
| Transfers | 0.01 |
| Other payment services | 0.44 |
| **Sum** | **2.91** |

Own production cost is distributed as follows:

| **Table 31:** Households: own production costs, by service | |
|---|---|
| Service | Own production cost (NOK billion) |
| Cash | 0.85 |
| Cash withdrawals and deposits | 0.66 |
| Cash Payments | 0.19 |
| Cards | 0.82 |
| Giro | 0.51 |
| **Sum** | **2.18** |

## Households' costs: details

*Fees*

For many years, Norwegian banks' prices have reflected relative differences in the costs of the various payment services. This has facilitated a move from services with a large element of manual processing to electronic services. Banks' income from the payment system was mainly based on transaction charges. This has changed, today a considerable share of the income comes from standing charges associated with customer programs and payment cards. At the same time, customer programs give large discounts on the listed prices. The programs make it more difficult for customers to compare prices for payment services of the various banks. This may hinder competition. Some banks have recently abolished annual fees. This may make it difficult to achieve cost recovery in the payment system.

*ORBOF-fees*

Banks' income from payment services is registered in the ORBOF (official reporting from banks and finance companies on accounts and income/cost). In their reporting, the banks don't split the income between income from merchants and income from households. The ORBOF fees are therefore distributed in this analysis according to the setup in chapter 2, based on the transaction statistics from the Norges Banks' Annual Report on Payment

Systems 2007. Details concerning the calculations distributing the ORBOF-income between merchants and households are found in the appendix to chapter 2.

*Interest cost (alternative value of money)*

Money deposited in a bank earns interest, as opposed to cash held, which give no yield. The "loss" incurred is called seigniorage cost, and is calculated in this analysis based on the average interest rate of NIBOR tomorrow / next for 2007 (5.15 % p.a.) The counterpart to this cost is the seigniorage income earned by the central bank. Seigniorage is discussed in more detail in appendix to chapter 2.

*Time costs*

Households spend time on several operations in their payment activities: Time is spent when they withdraw cash from an ATM, they also spend time getting to the ATM and when paying in a store. If we assume that time spent on these operations could be used on something else having a pecuniary value, these activities have a value we can calculate. In our calculations time cost represents nearly 48 % of households' total costs for paying.

## Cost for households paying bills

Households spend time when paying bills (giros) in a bank or when carrying out an Internet payment at home. The household survey does not include these payments. We have not found any information on time spent on these operations from other Norwegian sources. In the calculations for households' costs on bill payments, we assumed that a bill payment would on average require 60 seconds. This is an assumption made to illustrate the cost, and further study is required to make a more precise estimate.

## Other results

### The use of cards and cash

Based on the information from the survey the use of different payment instruments calculated for Norway total for 2007 is as follows:

**Table 32:** Households: number of transactions in Norway, 2007,basis: household survey and domestic statistics

| Base: residents | Transactions | | Value | |
|---|---|---|---|---|
| | Million transactions | Per cent | NOK billion | Per cent |
| **Point of sale total** | **1209.0** | **100.0 %** | **432.1** | **100.0 %** |
| **Cash use** | **285.0** | **23.6 %** | **62.1** | **14.4 %** |
| **Card use** | **924.0** | **76.4 %** | **370.0** | **85.6 %** |
| BankAxept | 805.3 | 66.6 % | 298.1 | 69.0% |
| Petrol companies cards | 21.6 | 1.8 % | 10.8 | 2 .5% |
| Visa, MasterCard, American Express and Diners Club | 97.1 | 8.0% | 61.0 | 14 .1% |

Based on survey results, cash use in Norway is low both measured by number of transactions and by value. The value is just 14 % of the value of sales at point of sale, while the number of cash transactions is just 24 % of the total. As can be seen from the table, card payments dominate at point of sale.

Norway is not a country with a very large tourist industry, so the effect of foreigners paying at point of sale in Norway is not substantial. However, it is likely that foreign visitors have a different payment pattern than Norwegians; they don't have access to the BankAxept solution, and will be more dependent on cash and international payment card schemes. In this analysis we have focused on residents' activities, so visitors are omitted.

The bulk of card use in Norway is through the domestic debit card solution, BankAxept. In 2007 debit cards account for 67 % of the number of transactions and 69 % of the value, while international card schemes account for 8 % of the number of transactions and 14 % of the value. The remainder is made up by petrol companies' cards and other local card solutions.

### Low cash use in Norway is indirectly supported by other surveys

As described earlier in this chapter, our household survey revealed that 14 % of the value and 24 % of the transactions at POS are paid by cash. This might seem to be very low. The

figures are much lower than corresponding figures from other European countries; a possible explanation might be that information from other countries dates back a few years.

The findings are to a large extent supported by other Norwegian surveys: The Norwegian Saving Banks Association (Sparebankforeningen) has each year since 2000 conducted a series of surveys primarily targeting the general public's attitudes to Internet banking. A minor part also deals with the use of cards and cash. The survey reveals that the use of cards in grocery stores has risen in the period 2005-2007. In 2007, 77 % used cards in payment operations at least every second time (of these 42 % always used cards, 20 % normally used cards and 15 % used cards every second time). 8 % never use cards when paying for groceries. In 2005, 72 % used their cards at least every second time.

A survey from BBS mapped the general public's attitudes towards the use of payment cards in 2007. In the survey, cards were the preferred way of paying for 74 %, while 23 % preferred cash. Every fourth card holder stated that he/she uses his/her cards more than ten times a week.

Possible shortcomings of the household survey are elaborated in chapter 3.

# 7 Cost surveys compared

## Introduction

Cost surveys have been carried out in a number of countries. In this chapter we have gathered information from the different surveys and tried to compare results. Comparison cannot be made easily, as both scopes and methodologies differ markedly. Furthermore, payment systems differ between countries, for example is the relative use of services with cost characteristics that varies very different between the countries discussed in this chapter. The size of the country matters as well, since many payment services are prone to be sensitive to effects from economies of scale.

The published cost surveys[35] can be divided in two groups:

- Surveys that calculate private and social costs of the national payment systems. These are surveys from Belgium, the Netherlands, Sweden, Portugal and Norway.
- Surveys that analyses whether the society is better off when inhabitants conduct an additional transaction by using payment cards than using paper instruments. These are surveys from Australia and USA. They also evaluate the costs and benefits of the transaction using different payment instruments The Australian study focuses on the marginal costs and benefits faced by consumers and merchants using different payment instruments

In this chapter we only refer to results from the European surveys. They have been conducted in countries with (relatively) similar payment systems and payment habits, where debit cards and giro are popular and cheques are not. The surveys also use similar methodologies, even if methodological choices separate them as well.

[35] Netherlands survey: Brits and Winder (2005) and Working Group on costs of POS payment products (2004), Belgium survey: Nationale Bank van Belgié (2005), Sweden: Bergman et al (2007) and (2008), Portugal: Banco de Portugal (2007), USA : Garcia-Swartz et al (2006a, b), Australia: Simes et al (2006).

## Five cost surveys

In the table below some data and characteristics from the cost surveys in Belgium, the Netherlands, Sweden, Portugal, and Norway are shown[36]. The surveys have to some extent the same scope, although it appears that the focus varies from survey to survey. The Belgian and the Dutch surveys have more or less identical scopes.

This simple comparison does not show all details of the surveys.

These countries are small and medium-sized. The varying size can influence the cost structure for the different agents and for the instruments. We therefore start out with some basic information from the countries[37].

**Table 33:** Country information

| | Belgium | The Netherlands | Sweden | Portugal | Norway |
|---|---|---|---|---|---|
| Survey year | 2003 | 2002 | 2002 | 2005 | 2007 |
| Population (million) | 10.4 | 16.2 | 8.9 | 10.6 | 4.7 |
| GDP total (billion) | 274.73 € | 465.21 € | 264.24 € | 149.12 € | 285.37 €[38] |
| Currency in circulation (billion) | 14.2 € | 16.9 € | 10.4 € | 12.8 € | 6.3 € |
| Value of currency as % of GDP | 5.2 % | 3.6 % | 3,94 % | 8.6 % | 2.2 % |
| Million card payments | 614.5 | 1192.8 | 454.0 | 761.5 | 967,0 |
| Card transactions per inhabitant per year | 59.2 | 73.6 | 50.9 | 72.2 | 205.7 |
| Cards issued (millions) | 15.6 | 26.7 | 10.4 | 16.4 | 9.2[39] |
| ATMs (thousands) | 12.5 | 7.5 | 2.6 | 13.8 | 2.3 |
| POS terminals (thousands) | 113.1 | 177.2 | 102.0 | 147.1 | 107.5 |

## Methodology and scope

Full cost surveys were conducted in the Netherlands and in Belgium, but they did not take into consideration household costs (shoe-leather cost etc). The studies also focused on point-of-sale services only (cash, cards and e-money), while bill payments were omitted. In the Netherlands the variable costs are either transaction-linked or sales-linked. This might be compared with the cost drivers in the ABC framework in the Norwegian survey.

[36] For details, it is advised to read the country reports.
[37] Information is collected from the ECB Statistics Data Warehouse for EU countries, the annual reports from the Belgian, Dutch, Portuguese and Swedish central banks and Norges Bank's Annual Report on Payment Systems 2007.
[38] Exchange rate: 1 € = NOK 8.02, daily average 2007.
[39] The figure is the number of physical cards. These cards have altogether 15.3 mill different functions (debit + credit).

The Swedish study focused on point of sale services, and covered many of the cost elements from the Norwegian survey. However, bill payments were not investigated in the Swedish survey.

The Portuguese survey considers both costs and benefits of the payment system. The Portuguese survey only looks at costs in the banking industry (based on an ABC-framework), and has no social cost calculations for the whole payment chain.

We would expect social costs in Norway to be higher than in the other countries based on the scope of the analyses. Point of sale costs should be comparable for Norway and Sweden, since roughly the same cost elements are included in both countries' studies.

Differences in use of payment services will affect the comparison of the analyses. Debit card payments have a systematically low social cost – in countries with a high use of debit card relative to credit card and cheques, the social cost will be lower than when the relationship is the opposite.

**Table 34:** Characteristics of the surveys

| | Norway | Portugal | Sweden | The Netherlands | Belgium |
|---|---|---|---|---|---|
| Results from (year) | 2007 | 2005 | 2002 | 2002 | 2003 |
| Scope | Calculate social and private costs of the payment services in Norway; calculate banks' private unit cost, compare 2007-cost with costs from 2001 and carry out calculations on banks' efficiency. | The purpose of the study was to assess the costs and benefits of the Portuguese payment system. | Calculate social and private cost for POS payments in Sweden and examine the thresholds above which one instrument is cheaper than another. | Identify and calculate social costs at POS and calculate possible cost savings when substituting expensive with cheaper instruments. | Identify and calculate total cost at POS and calculate possible cost savings when substituting expensive with cheaper instruments. |
| Organizing the surveys | Norges Bank took an initiative versus banks and banks' associations. It also cooperated with retail trade associations. No steering group. Apart from the input from the banks most work has been done by two employees in Norges Bank. | Headed by a steering committee with representatives from Banco de Portugal, members of CISP, the Portuguese Banking association and 5 banks. A technical working group was also established. An expert group in Banco de Portugal ensured continuity of the work. | Work in Sweden have been carried out in two phases: 2002/2004: The Riksbank collected data from the four largest Swedish banks. Cost recovery was focused. 2007: the survey was supplemented by a social and private cost calculation done by Riksbanks' employees and one academic from a Swedish University. | The work started out from the recommendations from the Wellink Working Group. The practical work was carried out by a working group consisting of a project team from DNB, representatives from the industry, Interpay, retailers and consumers. | The work was initiated by an agreement between the federal ministers of finance and consumer protection and the Belgian Association of Banks. The Belgian National Bank chaired a steering committee along with representatives from the industry. Two working groups were established. |

Table 34 cont.

| | Norway | Portugal | Sweden | The Netherlands | Belgium |
|---|---|---|---|---|---|
| Different sub-surveys | Bank survey, merchant survey, household survey (done by a market research company) | Bank survey, merchant survey (two studies, one on retailers and one on large retail outlets), household survey | Bank survey,household survey (2006), merchant data from "Svensk Handel" (2004) | Bank survey, merchant survey, household survey (note: costs not calculated) | Bank survey, merchant survey, household survey (note: costs not calculated) |
| Payment services | 35 cards, cash and giro instruments. | 6: credit cards, debit cards, credit transfers, direct debits, cheques and cash | 3: credit and debet cards and cash. | 4: credit and debet cards, e-purse and cash. | 4: credit and debet cards, e-purse and cash. |
| Payments and payment instruments not included | Interbank payments, cheque payments, e-money and cross-border payments. | Only retail transactions less than 100 000 €. Foreign exchange operations are excluded. | Giro instruments, cheques and e-money. | Giro instruments and cheques | The costs of payments between professional operators and between private individuals outside points of sale (particularly bank transfers and standing orders/direct debit) is not included. |
| Agents, including subcontractors | Banks, central bank, merchants and households. | Banks | Banks, central bank, merchants and households. | Banks, central bank and merchants. | Banks, central bank and merchants. |
| Banks participating | 12 Norwegian banks, representing approximately 55 % of total market. | 5 banks (BES, Banco BPI, Banco Santander Totta, BCP and CGD) and Unicre. These banks represented 76.8 % of total cost in the banking | The 4 largest Swedish banks, representing 92 % of market. | ABN AMRO, Rabobank, Postbank and ING Bank participated. | The network operators Banksys, the Bank Card company and 10 banks participated (12 banks were invited). |
| Classifying the costs (and activities) | 1: Direct and indirect costs, 2: Costs related to cash-handling, costs related to other payment services and other costs. | 1: Direct and indirect costs, 2: (for activities) activities directly related, activities not related and supporting activities. | 1: Direct and indirect costs, 2: Private and social costs, 3: Variable and fixed | 1: Variable and fixed costs, 2: private and social costs, 3: front and back office costs, 4: Transaction linked and sales linked | 1: In banks: "front office" and "back office", 2: Variable and fixed costs, 3: variable to transactions and variable to turnover, 4: general head office overheads and central administration overheads. |
| Cost savings and break-even calculated | No | Yes | Yes | Yes | Yes |

## Results

The level of the calculated social cost in the different countries reflects differences in scope, methodology and use of payment services. Table 35 illustrate that the social cost is not directly comparable between countries due to different scope and methodology. Still, we can make some observations from the surveys that can illustrate how the differences in use of services affect the results.

**Table 35:** Social cost

| Country | Year | Agents | Services | Costs as % of GDP |
|---|---|---|---|---|
| Norway | 2007 | Banks, merchants and households | Cash, cards, giro | 0.49 % |
| Portugal | 2005 | Banks | Cash, cards, cheque, giro | 0.77 % |
| Sweden | 2002 | Banks, merchants and households | Cash, cards | 0.40 % |
| Belgium | 2003 | Banks, merchants | Cash, cards, e-money | 0.74 % |
| The Netherlands | 2002 | Banks, merchants | Cash, cards, e-money | 0.65 % |

The scope of the surveys can be measured by investigating how large proportion of non-cash transactions is covered and how many agents the surveys include. The table below shows this, note that cash transactions are excluded.

**Table 36:** Scope of surveys

| | Number of transactions in the survey in per cent of total number of transactions (cash payments excluded) | Number of agents in the survey to total number of agents. 6 (potential) agents: banks, central bank, subcontractors, payers, payees and bill issuers |
|---|---|---|
| **Norway** | 100 % | 5 of 6 |
| **Portugal** | 100 % | 3 of 6 |
| **Sweden** | 51 % | 4 of 6 |
| **Belgium** | 40 % | 4 of 6 |
| **The Netherlands** | 35 % | 4 of 6 |

The low percentages for Belgium, The Netherlands and Sweden are due to the fact that giro transactions (bill payments) are not a part of these surveys. The Portuguese and the Norwegian surveys cover all transactions (insignificant instruments like e-money and cheque are omitted in the Norwegian survey).

In Norway the point of sale services represents 79 % of total costs, while bill payment / giro represent 21 %. In Norway the use of cheques is almost non-existent. If we only look at the relative cost share of POS instruments we have the following picture:

**Table 37:** Relative cost share of point of sale services

| Country | Cash | Cards | Other |
|---|---|---|---|
| Norway | 39 % | 61 % | - |
| Portugal | 18 % | 52 % | (cheques ) 30% |
| Sweden | 77 % | 23 % | - |
| Belgium | 78 % | 20 % | (e-money) 2 % |
| The Netherlands | 73 % | 24 % | (e-money) 3 % |

Sweden, Belgium and The Netherlands have almost the same structure, while the structures in Norway and especially Portugal are different. The high cost share of cash in Sweden, Belgium and the Netherlands is somewhat surprising. These countries also have efficient payment systems with a high card use. An explanation to the relatively low share of cash cost in Norway is the low use of cash, an efficient distribution system for cash and a very extensive use of cards (compared to Sweden, Belgium and The Netherlands). The low share of cash cost in Portugal is probably due to the limited scope of that survey – only banks' cost on deposits and withdrawals are included. One should also note that the calculations for Norway are based on more recent data than in the other countries – so the move from cash to cards has had a few more years in Norway.

If we just look at the Norwegian banks the ratio of total private costs for cash and cards is the same as the ratio for social costs for cash and cards for Norway, 39 % vs. 61 %. In chapter 6 cash use in Norway is further elaborated.

The costs in the payment process may be split on the various agents participating:

**Table 38:** Agent's share of social cost

| Country | Banks | Currency issuing | Merchants | Households |
|---|---|---|---|---|
| Norway | 66 % | 1 % | 14 % | 20 % |
| Portugal[40] | - | | - | |
| Sweden | 62 % | 3 % | 19 % | 16 % |
| Belgium | 47 % | 2 % | 51 % | - |
| The Netherlands | 48 % | 2 % | 50 % | - |

[40] Only banks' costs are included in the survey.

The Portuguese survey only look at banks' cost, and household costs are not a part of the Belgian and Dutch surveys. The results of the Belgian and the Dutch surveys are very similar. The Swedish and Norwegian results are also similar. The banks' share of total cost is much higher in the Scandinavian countries than in Belgium and the Netherlands, while merchants share are low. This does not seem to be caused by differences in methodology. Maybe differences in cash handling at merchants can be part of the explanation.

The use of different payment instruments varies between countries and so do the unit costs of the different instruments. Below we present the unit cost of the most common main groups of instruments.

**Table 39:** Social cost per payment (€)

| Country | Cash | Debit cards | Credit cards | Other |
|---|---|---|---|---|
| Norway | 0.88 | (All cards ) 0.74 | | |
| Portugal | 1.85 | 0.23 | 2.44 | (cheque) 1.45 |
| Sweden[41] | 0.50 | 0.34 | 0,48 | |
| Belgium | 0.53 | 0.55 | 2.62 | (e-money) 0.54 |
| The Netherlands | 0.30 | 0.49 | 3.59 | (e-money) 0.93 |

The use of cash varies between countries. In table 40 information on cash use is presented:

**Table 40:** Use of cash

| Country | Per cent of cash transactions to total number of transactions | Per cent of cash to total turnover at point of sale |
|---|---|---|
| Norway | 24 % | 14 % |
| Portugal | 26 % | - |
| Sweden | 72 % | 39 % |
| Belgium | 81 % | 63 % |
| The Netherlands | 85 % | 56 % |

The level of cash use in Norway is very low. Typically, cash payments are small-value, as the relative number of transactions are lower than the value paid.

## Conclusive remarks

The surveys share many features, but there are also important differences. Even though the surveys present some of the same key figures, for instance the cost to GDP-ratio, one should

[41] 1 € = 9.16 SEK daily average 2002.

be cautious when comparing. All numbers must be regarded as indications. One should also be aware that in addition to what can be considered as "technical differences", there are real differences between the payment systems.

Even though it is difficult to compare the surveys, we think that comparisons between countries are valuable. The results can be used as a benchmark for countries working to improve their payment systems.

This chapter illustrates that it is necessary to improve or coordinate the development of methodologies in this field to be able to compare countries in a more consistent manner. With SEPA being established in Europe, standardizing payment solutions, perhaps differences in services will be less of a problem in the future.

# 8 Conclusion

In this analysis we have calculated the cost of payments. We have demonstrated that using data from surveys and statistics can provide a basis for the calculations made, but there are also shortcomings to this approach.

The analysis covers payment activities in banks, at merchants / point of sale, and in households. The analysis covers the most widely used payment services. The full cost to the society of cash and card use, and most of the cost to the society of giro use is calculated. However, some services have deliberately been omitted[42]. To calculate the full (true) social cost, a widening of the scope would be necessary.

The social costs of payments is low, only 0.49 % of GDP in Norway in 2007. Roughly half the costs are generated by card payments. In 2007, a total of 1.8 billion cash, card and giro payments were made; banks processed more than 1.5 billion of these. Banks have improved their efficiency in delivering payment services, producing more transactions at a lower cost than before. Production costs, mainly costs in banks and at banks' subcontractors, account for about 2/3 of social cost.

[42] The analysis does not calculate costs of cheques, E-money, interbank transfers or cross-border payments. Payments carried out by Norwegians abroad or visitors to Norway are not covered by the analysis. This is partly due to low use, but also to limit the scope of the analysis.

The analysis has uncovered a low use of cash, about 14 % of the value and 24 % of the number of transactions at point of sale, lower than in other countries. Cash generate 31 % of social costs, mainly because cash handling is costly.

Calculation of unit costs per payment for the most important services in Norway shows that high-volume, electronic services have the lowest unit costs. In 2007 96 % of non-cash payments were electronically processed in Norway. The share of electronic payments has been increasing for many years, partly due to the pricing strategy by banks. Prices on payment services have reflected relative differences in the costs.

In Koivuniemi and Kemppainen (2007) methodologies used in cost surveys are assessed, among these the Norwegian 2001-survey. Weaknesses of the ABC methodology is discussed, and also of the methods of the analysis done in the Netherlands, Sweden and Belgium. In Jonker and Kosse (2008), weaknesses of the method we have chosen for the household survey is further elaborated. It goes without saying that care should be taken in interpreting the results in this Staff Memo, as no calculation is better than the underlying assumptions. If an analysis like this were to be done in the future, possible improvements could be:

- A merchant survey based on observations of a team of researchers, rather than a survey based on questionnaires (which gave a low response rate and poor quality to some of the answers)
- A household survey that was based on payments diaries rather than omnibus phone survey. That said, we feel confident that the results from our phone survey held an acceptable quality level, so in our opinion a phone survey is a good alternative. The costs are calculated on the basis of a number of assumptions in the household survey, so a potential extension to that survey could have been to investigate households' costs further.
- Bank and subcontractor surveys can be performed in various manners, but to our experience, the ABC framework produce results of good quality and great detail. To succeed with such an analysis, highly motivated respondents is a necessity, and simpler approaches might be better for achieving results in other countries.

Domestic payment, salary and demographic statistics of high quality and detail have been a prerequisite to make this analysis possible. Care should be taken to gather the correct

statistics. One specific challenge is to get a correct estimate of the number of transactions, not an easy task in a two-sided market where transactions are counted a number of times in the payment process.

Norges Bank has for years promoted a view that payment services should be priced and that the price level should reflect relative differences in the cost (of production of payment services) level. The discussion of banks' income and fee structure in this memo illustrate the challenges in this area. In 2008, a number of banks in Norway abandoned their per-transaction-prices altogether (no fee-policy). Wider use of product packages and annual fees will make it harder to track the cost-price-relation of the different payment services. A cost analysis is still useful to banks, overseers and regulators, as observations on the use of resources can contribute to developments that can lead to an even more efficient payment system in the future.

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# Appendixes

## Appendix to chapter 2 Social cost

### Assumptions

The social cost calculation rests on a set of assumptions.

### Social cost per transaction and per krone

Social cost per transaction for Norway is calculated as $\frac{Social\ costs\ per\ instrument}{Number\ of\ transactions\ per\ instrument}$

Social cost per krone for Norway is calculated as $\frac{Social\ costs\ per\ instrument}{Value\ paid\ in\ society\ using\ the\ instrument}$

Number of transactions is based on statistics from Norges Banks' Annual Report on Payment Systems 2007 and on calculations made in our surveys. "Other deposits and withdrawals" is the sum of deposits over the counter, bulk deposits and night safe, bulk withdrawals and withdrawals over the counter. The number of transactions of these deposits and withdrawals in the society are based on observations from the 12 banks in the bank survey, explained in appendix to chapter 4. Number of transactions and value of "Cash payments" is based on observations from the household survey, explained in Gresvik and Haare (2008a).

### Social cost per instrument (cash, card and giro)

Social cost per instrument is calculated as follows:

$$Social\ cost = \sum Own\ production\ costs\ per\ agent$$

$$Own\ production\ cost = Private\ costs - Fees\ paid$$

$$Net\ private\ cost = Private\ costs - Fees\ recieved$$

These definitions will also be used on a per unit basis.

### Social cost of cash

Social cost of cash is the sum of social costs for deposits, withdrawals and payments. Social costs are calculated on the basis of private costs and fees paid, as mentioned above. Private

costs are based on results from the bank survey and the merchant survey. Private costs were calculated from the number of transactions and some assumptions in the household survey. The tables A2.1 – A2.5 show how cash use costs are distributed across agents.

## Seigniorage

In the social cost calculation, seigniorage is eliminated, since seigniorage is income for the central bank and costs for others. However, the seigniorage calculation is shown in this memo. It rests on some assumptions that need to be explained.

Seigniorage is interest income/loss on cash issued/held. Norges Bank issues cash and has thus a potential income in the possible alternative: a risk free investment. Households, banks and other agents (merchants and others) hold cash, and thus have an interest loss on the alternative investment (for example a deposit in a bank). Our calculations were based on the average annual tomorrow/next NIBOR interest rate for 2007, (4.75%)[43].

Total seigniorage is the interest loss/income on the total stock of cash outstanding (NOK 51.5 billion in 2007). However, only stock of cash held for payment purposes are relevant in this analysis. Based on information from the three surveys, cash stock held for payment purposes is NOK 15.4 billion (Banks: NOK 3.11 billion, households: NOK 9.75 billion, merchants and others: NOK 2.54 billions) . Based on an average interest rate of 4.75 per cent this gives a seigniorage cost of NOK 732 million. [44].

However, there is also other information accessible from Statistics Norway (described in Gresvik and Haare 2008a), and we have made an alternative calculation of seigniorage based on these statistics as well. Based on this information, cash stock held for payment purposes is NOK 15.7 billion (Banks: NOK 5.66 billion, households: NOK 5.67 billion, merchants and others: NOK 4.33 billions). Based on an average interest rate of 4.75 per cent this gives a seigniorage cost of NOK 745 million.

In this analysis, we use the first calculation, since it is based on information from the surveys. The sum of seigniorage is not very different in the two alternative calculations. The distribution of seigniorage is, however, very different between the agents in the two calculations, and this will affect the size of the private cost to the agents (not the social cost,

[43] See: http://www.norges-bank.no/webdav/stat/no/renter/renter_mnd.sdv

though). The second calculation is possible to do on a yearly basis, since the information is based on official statistics.

**Table A2.1**: Cash: payments, deposits and withdrawals
Seigniorage included

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 485.7 | 0.0 | 485.7 | 506.0 | -20.2 |
| Norges Bank | -577.4 | 27.3 | -604.7 | 6.2 | -583.6 |
| Banks | 2342.4 | 479.6 | 1862.8 | 592.7 | 1749.8 |
| Households | 1904.4 | 592.7 | 1311.7 | 0.0 | 1904.4 |
| Merchants and other businesses | 443.0 | 5.2 | 437.8 | 0.0 | 443.0 |
| | 4598.1 | 1104.8 | **3493.3** | 1104.8 | 3493.3 |

**Table A2.2:** Cash: deposits and withdrawals only
No seigniorage

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 480.7 | 0.0 | 480.7 | 500.7 | -20.0 |
| Norges Bank | 154.9 | 27.3 | 127.6 | 6.2 | 148.7 |
| Banks | 2194.6 | 479.6 | 1715.0 | 592.7 | 1602.0 |
| Households | 1248.3 | 592.7 | 655.6 | 0.0 | 1248.3 |
| Merchants and other businesses | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 4078.5 | 1099.6 | **2979.0** | 1099.6 | 2979.0 |

**Table A2.3:** Cash: deposits and withdrawals only
Seigniorage included

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 480.7 | 0.0 | 480.7 | 500.7 | -20.0 |
| Norges Bank | 7.1 | 27.3 | -20.2 | 6.2 | 0.9 |
| Banks | 2342.4 | 479.6 | 1862.8 | 592.7 | 1749.8 |
| Households | 1248.3 | 592.7 | 655.6 | 0.0 | 1248.3 |
| Merchants and other businesses | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 4078.5 | 1099.6 | **2979.0** | 1099.6 | 2979.0 |

**Table A2.4:** Cash: payments only
No seigniorage

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 5.0 | 0.0 | 5.0 | 5.2 | -0.2 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Households | 192.4 | 0.0 | 192.4 | 0.0 | 192.4 |
| Merchants and other businesses | 322.1 | 5.2 | 316.9 | 0.0 | 322.1 |
| | 519.6 | 5.2 | **514.3** | 5.2 | 514.3 |

| **Table A2.5:** Cash: payments only<br>Seigniorage included | | | | | |
|---|---|---|---|---|---|
| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
| Subcontractors | 5.0 | 0.0 | 5.0 | 5.2 | -0.2 |
| Norges Bank | -584.5 | 0.0 | -584.5 | 0.0 | -584.5 |
| Banks | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Households | 656.1 | 0.0 | 656.1 | 0.0 | 656.1 |
| Merchants and other businesses | 443.0 | 5.2 | 437.8 | 0.0 | 443.0 |
| | 519.6 | 5.2 | **514.3** | 5.2 | 514.3 |

## Social cost of cards

Calculation of social cost of cards is based on the private costs of the agents including the fees paid/received. Social cost of cards include usage and infrastructure costs (terminals etc), both on the issuing and acquiring side.

There is not sufficient information to split costs on debit and credit cards, only on BankAxept and international card schemes. The reasons for this is that i) the domestic statistics are not sufficiently detailed on this matter, ii) the information on banks' fees are not split in debit and credit cards, iii) the merchants cannot make a distinction between card payments based on credit or deposits from international cards and iv) the household survey did not focus on cardholders costs, only on use.

| **Table A2.6:** BankAxept | | | | | |
|---|---|---|---|---|---|
| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
| Subcontractors | 931.7 | 0.0 | 931.7 | 970.5 | -38.8 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 1926.1 | 970.5 | 955.6 | 604.0 | 1322.1 |
| Households | 1170.4 | 592.7 | 577.7 | 0.0 | 1170.4 |
| Merchants and other businesses | 873.2 | 11.4 | 861.8 | 0.0 | 873.2 |
| | 4901.3 | 1574.5 | **3326.8** | 1574.5 | 3326.8 |

| **Table A2.7:** International card schemes | | | | | |
|---|---|---|---|---|---|
| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
| Subcontractors | 617.1 | 0.0 | 617.1 | 642.8 | -25.7 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 1459.5 | 642.8 | 816.7 | 1480.6 | -21.1 |
| Households | 831.9 | 592.7 | 239.2 | 0.0 | 831.9 |
| Merchants and other businesses | 1244.0 | 888.0 | 356.0 | 0.0 | 1244.0 |
| | 4152.5 | 2123.4 | **2029.1** | 2123.4 | 2029.1 |

## Social cost of bill payments: Giro

Domestic bill payments are generally paid electronically in Norway. The dominant payment solution is Internet banking. Payments are made both as credit transfers and as direct debits. The tables show how giro costs are distributed across agents. Calculations are shown in appendix chapter 4, 5, and 6. Note that for merchants and others the giro calculation is not as complete as for cash and cards. There is not sufficient information on time spent on paying these giros to make estimates on the costs.

| **Table A2.8:** Electronic Giros | | | | | |
|---|---|---|---|---|---|
| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
| Subcontractors | 269.8 | 0.0 | 269.8 | 281.0 | -11.2 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 1035.4 | 281.0 | 754.4 | 1698.4 | -663.0 |
| Households | 1198.1 | 740.7 | 457.5 | 0.0 | 1198.1 |
| Merchants and other businesses | 957.8 | 957.8 | 0.0 | 0.0 | 957.8 |
| | 3461.1 | 1979.4 | **1481.6** | 1979.4 | 1481.6 |

| **Table A2.9:** Paper based Giros | | | | | |
|---|---|---|---|---|---|
| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
| Subcontractors | 65.0 | 0.0 | 65.0 | 67.7 | -2.7 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 771.3 | 67.7 | 703.6 | 832.7 | -61.4 |
| Households | 446.9 | 388.6 | 58.3 | 0.0 | 446.9 |
| Merchants and other businesses | 444.1 | 444.1 | 0.0 | 0.0 | 444.1 |
| | 1727.3 | 900.4 | **826.9** | 900.4 | 826.9 |

**Table A2.10:** Internet banking (Giro payments)

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 171.5 | 0.0 | 171.5 | 178.7 | -7.1 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 641.6 | 178.7 | 463.0 | 898.8 | -257.2 |
| Households | 974.4 | 576.4 | 397.9 | 0.0 | 974.4 |
| Merchants and other businesses | 322.4 | 322.4 | 0.0 | 0.0 | 322.4 |
| | 2109.8 | 1077.5 | **1032.4** | 1077.5 | 1032.4 |

**Table A2.11:** Credit transfers (Giro payments)

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 282.4 | 0.0 | 282.4 | 294.2 | -11.8 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 1652.1 | 294.2 | 1358.0 | 2190.2 | -538.0 |
| Households | 1435.6 | 962.0 | 473.6 | 0.0 | 1435.6 |
| Merchants and other businesses | 1228.2 | 1228.2 | 0.0 | 0.0 | 1228.2 |
| | 4598.3 | 2484.3 | **2113.9** | 2484.3 | 2113.9 |

**Table A2.12:** Direct debits (Giro payments)

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 31.2 | 0.0 | 31.2 | 32.5 | -1.3 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 131.4 | 32.5 | 98.9 | 252.2 | -120.8 |
| Households | 124.3 | 124.3 | 0.0 | 0.0 | 124.3 |
| Merchants and other businesses | 127.8 | 127.8 | 0.0 | 0.0 | 127.8 |
| | 414.8 | 284.7 | **130.1** | 284.7 | 130.1 |

**Table A2.13:** Other transfers

| NOK millions | Private cost | Fees paid | Own production cost | Fees received | Net Private costs |
|---|---|---|---|---|---|
| Subcontractors | 21.2 | 0.0 | 21.2 | 22.1 | -0.9 |
| Norges Bank | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Banks | 23.2 | 22.1 | 1.1 | 88.8 | -65.6 |
| Households | 85.1 | 42.9 | 42.2 | 0.0 | 85.1 |
| Merchants and other businesses | 45.8 | 45.8 | 0.0 | 0.0 | 45.8 |
| | 175.3 | 110.8 | **64.5** | 110.8 | 64.5 |

## Distribution of fees

Information on fees is collected from the ORBOF database. The fees are banks' reported total income from payment services. The Norwegian banks base their fee structure on

customer programs (loyalty schemes). For instance, a customer pay a fixed monthly fee to the bank for a number of "free" transactions on cards, giros etc. In Norges Banks' Annual Report on Payment Systems 2007, list prices on the most important payment services are shown in Table 24. Also transactions are shown in different tables in the report. If list prices are multiplied by the number of transactions, the calculated fee income will exceed the income reported to ORBOF. ORBOF statistics show only the sum of fees income, the sum is split on different services by the banks themselves. We therefore use the ORBOF statistics, as it is based on discounted fees, and reflects the real income banks have on providing payment services. The ORBOF information is not very granulated, so we have made a number of assumptions when making the calculations for this analysis. The data from ORBOF is shown in table A2.14:

**Table A2.14:** Distribution of ORBOF fees 2007

| | Total fees (NOK 1000) | |
|---|---|---|
| Paper based Giro | 737 942 | Distributed according to subsection *Giro* |
| Electronic Giro | 770 792 | Distributed according to subsection *Giro* |
| Transfers | 22 587 | Distributed according to subsection *Giro* |
| Other payment services | 1 000 178 | Distributed according to subsection *Giro* |
| Card payments | 2 677 301 | Distributed according to subsection *Cards* and *ATMs* |
| **Sum** | **5 208 800** | |

*Giro*

In ORBOF statistics, we consider bill payment fees to be fees for paper based and electronic Giro, transfers and other payment services. To distribute the bill payment fees to merchants, other businesses and households, we calculated corporate customers and retail (households) customer market shares based on the bill payment statistics from Norges Banks' Annual Report on Payment Systems 2007, table 10. In Table 10, the only services which show market shares for corporate and retail is Internet banking services and the "Company terminal giro" service. Lacking other information of market shares, we apply the market shares for Internet banking to all other services. The Internet banking market shares were 48.4 % for retail customers and 51.6 % for corporate customers. Based on these market shares, fee shares were calculated (fee share = share of ORBOF fee to be distributed to the service based on market shares and number of transactions for the service). The fee

shares formed the basis for distributing fees to the retail and corporate customers for different bill payment services.

$$Fee\,share\ (the\ unknown\ value)$$

$$= \frac{Fees\ income\ for\ relevant\ service\ range\ x\ No.\ of\ transactions\ for\ each\ service\ for\ each\ market}{\sum No.\ of\ transactions\ for\ relevant\ service\ range}$$

The relevant service range is for example "electronic giro". To illustrate this, have a look at the second row in Table A2.15: Electronic giro for retail customers:

- Market share of **48.4%** is given, as explained above.
- Number of transactions is based on Table 10 in Norges Banks' Annual Report on Payment Systems 2007 as **154.2** million retail Internet banking transactions + 48.4% x (sum of direct debits (49.6), telephone giros (13.9) and misc. other electronic transfers(33.8) = **201.3** million transactions
- Fee share = 201.3/(electronic credit transfers (412.7) + direct debits (49.6)) = **43.5%.**
- Electronic giro give banks a fee income of NOK 771 millions in 2007 (source: ORBOF). Fee share (of electronic giro) 43.5% x 771 = fees paid by retail customers = NOK **336** million in second row in Table A2.17 (retail customers electronic giro cost.

**Table A2.15:** ORBOF Fee share calculated on the basis of market share

| *Retail Customers* | Market share | Million transactions | Fee share |
|---|---|---|---|
| Internet banking solutions | 48.4 % | 154.2 | 33.4 % |
| Electronic giro | 48.4 % | 201.3 | 43.5 % |
| Paper based giro | 48.4 % | 22.6 | 46.7 % |
| Direct debits | 48.4 % | 24.0 | 5.0 % |
| Credit transfers | 48.4 % | 183.5 | 38.5 % |
| Other transfers | 48.4 % | 16.3 | 3.2 % |
| **Sum Retail Customers** | 48.4 % | **223.9** | **43.8 %** |
| | | | |
| *Corporate customers* | Market share | Million transactions | Fee share |
| Internet banking solutions | 51.6 % | 164.6 | 35.6 % |
| Electronic giro | 51.6 % | 260.9 | 56.4 % |
| Paper based giro | 51.6 % | 25.8 | 53.3 % |
| Direct debits | 51.6 % | 25.6 | 5.4 % |
| Credit transfers | 51.6 % | 243.7 | 51.1 % |
| Other transfers | 51.6 % | 17.5 | 3.4 % |
| **Sum Corporate Customers** | 51.6 % | **286.7** | **56.1 %** |

*Cards*

Calculation of distribution of ORBOF card fees are based on a different set of assumptions.

- Value of Card fees was NOK 2,677 million (see Table A2.14).
- We assume that the card users and card acceptances are households, merchants and other businesses.
- From the merchant survey we have costs of card acceptance (NOK 44 millions for international cards and NOK 5.7 millions for BankAxept).
- We assume that card acceptance has the same cost for merchants and for other businesses
- The rest, NOK 1,777 millions, is distributed to households and split in three equal parts on international card payments, on BankAxept card payments and ATM withdrawals (see table A2.17).

In the merchant survey, a group of questions focused on the fees merchants paid for having access to card schemes. This covered international card schemes and BankAxept. The distribution of card fees from ORBOF to merchants is based on the information from the survey. From the survey, card unit fees paid by merchants to banks and other card service providers were calculable. Multiplying the unit fees paid by number of transactions at point of sale gave the sum of fees paid by merchants to banks and others:

$$Card\ unit\ fee\ paid\ by\ merchants\ \times No.of\ card\ transactions\ at\ point\ of\ sale = \sum Fees\ paid\ by\ merchants\ for\ card\ services$$

It was not possible to distinguish between debit and credit cards in the merchant survey. However, the merchants could separate fees paid for card services for different schemes (BankAxept and International card schemes). The results from the survey are shown in the table below:

**Table A2.16:** Merchants' fees paid for card services

| | Unit Cost (NOK) | Transactions | NOK thousands |
|---|---|---|---|
| BankAxept | 0,0070 | 805 338 241 | 5 675 |
| International card schemes | 4,5744 | 97 057 228 | 443 976 |

Note that these fees are only part of merchants' private costs (fees paid are part of subcontractor cost, while the merchants also have own production costs, as discussed above).

When distributing fees, we separate between households (retail market) and corporate (merchants and other businesses). That gives two corporate markets and one retail market.

Unfortunately, this is all the information we are able to collect. We have information sufficient to calculate fees distributed on corporate and retail markets, but only by making some bold assumptions on the distributions.

For the corporate market, we separate between merchants and other businesses. We only have information on fees on the corporate market as a whole for bill payments, while we only have information on fees paid by the merchant part of the corporate market for card payments.

For the households/retail market, we only have adequate information to calculate bill payment fees directly, but that is not the situation for card payment fees.

To solve this problem, we choose to look at the three markets in combination. For bill payments, we split the corporate market in two equal parts: merchants and other businesses. Bill payment fees are distributed equally between the two corporate markets and the remaining is distributed to households. For example, the calculation above showed that 56.4 % of paper based giro fees were generated by corporate electronic payments. This is (56.4% X 737.942) = NOK 393.545 millions. Split equally between the two corporate markets, NOK 196.772 millions are laid on merchants and other businesses, respectively. The remaining 43.6% of paper based giro fees are laid on households (NOK 344.397 millions). All bill payment fees are distributed this way, according to the fees shares calculated above.

When looking at the three markets in combination for card fees, a different approach is used. As mentioned, the merchant survey provided information on card fees paid. Assuming that other businesses receive payments by card, part of the card fees should be distributed to them. However, we do not have any information on how much this is. It is perhaps likely that cards are used less at non-point-of-sale businesses, but we cannot know for sure. To

make the calculation simple, we chose to distribute the same amount of card fees to other businesses as to merchants.

*ATMs*

Furthermore, merchants and other businesses are assumed not to use ATMs. Only households use ATMs to access cash, and pay fees for that service. Without any information[45] on the split on fees paid for the card services used by households (BankAxept, international cards and ATMs) we have split the remaining card fees (after subtracting the card fees to corporates from the ORBOF value) equally on the three household services.

**Table A2.17:** Distribution of ORBOF fees

| | | Result from calculation based on assumptions | | |
|---|---|---|---|---|
| | Total fees (NOK 1000) (Table A2.14) | To merchants | To other businesses | To households |
| Paper based Giro | 737 942 | 196 772 | 196 772 | 344 397 |
| Electronic Giro | 770 792 | 217 530 | 217 530 | 335 565 |
| Transfers | 22 587 | 5 831 | 5 831 | 10 925 |
| Other payment services | 1 000 178 | 280 791 | 280 791 | 438 400 |
| Card payments | 2 677 301 | 449 651 | 449 651 | 1 777 998 |
| Calculated: to BankAxept | | 5 675 | 5 675 | 592 666 |
| Calculated: to International card schemes | | 443 976 | 443 976 | 592 666 |
| Calculated: to ATMs | | | | 592 666 |

*(a rounding error in Norges Banks' Annual Report on Payment Systems 2007 (Table 10) is reflected in the second and eight row – the sum of the three right-hand columns diverge slightly from the left column)*

[45] There is some support for our choice of card fee distribution in two studies on card fee structure done in 2004 and 2007 for Norwegian cards. See http://www.kredittilsynet.no/archive/f-avd_pdf/01/03/Rappo059.pdf and www.kredittilsynet.no/archive/f-avd_word/01/03/Utred066.doc (both publications in Norwegian only)

# Appendix to Chapter 4 Costs in banks

## Assumptions

### A simplified Activity Based Costing (ABC) analysis

An analysis based on the ABC framework can be very detailed. In a large organization it is possible to identify thousands of activities necessary to produce the different services delivered.

This survey covers only a small part of banks' business activities, namely payment services and cash handling. The survey was designed to be of use in any kind of bank, and was therefore designed to be simple and automated. The questionnaire itself gave few options to adapt to special circumstances in the participating banks. Because of this, the survey was designed with relatively few activities and few services, but the intention is still to use it as a full-cost-study of banks. With a more detailed analysis it is possible to granulate the cost estimates further. However, in the survey a few banks used their own internal ACB calculation framework, and some banks made small adjustments to the standard framework.

Activities generate costs, and the output generated by activities decides the size of the costs. In this survey, cost drivers for payment services and cash handling are the number of payment transactions, number of deposits, number of withdrawals and number of accounts. There are also other possible cost drivers, but for simplicity, we kept the range at a minimum.

The general ledger is not a sufficiently detailed source of information for an ABC- analysis. Cost information was therefore based on financial accounts, bank-internal information on the composition of the costs shown in the financial accounts and of imputed costs (replacing and sometimes adding to costs from financial accounts). Imputed costs were used for depreciation of property, IT, research and development, interest loss on cash held and a few other areas. The intention was to estimate a more realistic cost to the bank than what was shown in the general ledger. The effect was that costs for cash handling and payments are somewhat higher than if they were based on information from the general ledger only.

## Particularly important assumptions in the ABC analysis

The analysis makes assumptions on how costs are distributed to separate areas within a bank. This distribution is not necessarily reflected in the banks' official accounts or ordinary organization chart. The reason is that cash handling and payment services seldom are organized as separate departments in the organization.

## Results: Assumptions

12 banks responded to the survey. We consider these banks to be representative for banks in Norway. The 12 banks cover 55 per cent of the total assets in the banking market in Norway, and consist of small and large banks, savings banks and commercial banks.

Private costs for payment and cash services in banks are calculated as:

$$\sum_{i=0}^{n}(Weighted\ average\ private\ unit\ cost\ \times No.of\ transactions\ in\ society)$$

for each *(i)* of the *n* services offered by the banks that responded to the survey. Of the 35 services included in the survey, only 26 are published, which covered the most widely used cash-, card- and giro services. Not all banks in the survey offered all services, and for some of the services we did not achieve sufficient quality of the answers to publish the results (anonymity reasons). 5 services are omitted as it was not possible to calculate a viable market share, and the quality of information provided by the few banks that offered these services was not sufficient to make basis for calculations. These five services generate costs in banks for other agents, costs that are not covered by the survey. Costs for two services (OCR) were distributed on other giro services, while four giro services were combined in two services. This is shown it table A4.1.

| **Table A4.1:** How the 35 services in the bank survey is treated: only 26 services form the basis for the cost calculation. | | |
|---|---|---|
| **35 services from the questionnaire** | **How service is treated in analysis** | **26 services published in analysis** |
| Telephone giro | Weighted average unit cost (W.A.C.)for the service based on the 12 banks, including OCR costs | Telephone giro |
| Internet banking retail customers | W.A.C. for the service based on the 12 banks, including OCR costs | Internet banking retail customers |
| Internet banking corporate customers | W.A.C. for the service based on the 12 banks, including OCR costs | Internet banking corporate customers |
| Direct Debits (Avtalegiro) | W.A.C. for the service based on the 12 banks, including OCR costs | Direct Debits (Avtalegiro) |
| Remittance / company terminal giro (CID / notified and unnotified) | W.A.C. for the service based on the 12 banks, including OCR costs | Remittance / company terminal giro (CID / notified and unnotified) |
| Giromail | W.A.C. for the service based on the 12 banks, including OCR costs | Giromail |
| Giro credited at the counter | Giro credited and paid in cash at the counter is combined in one service (Giro OTC). Weighted average unit cost for the service based on the 12 banks, including OCR costs | Giro OTC |
| Giro paid in cash at the counter | | |
| Remittance / company terminal giro sent as a money order | Remittance / company terminal giro sent as a money order and Internet Banking Money Order is combined in one service W.A.C.for the service based on the 12 banks, including OCR costs | Remittance / company terminal giro sent as a money order and Internet Banking Money Order |
| Internet Banking Money Order | | |
| Optical Character Recongition (OCR) - File | OCR-costs are added to the cost of other services where number of transactions for each giro service is the distribution key: sum of direct and indirect costs service N) + (total costs of OCR File and Return) / ((number of transactions for instrument N) / (sum of all giro service transactions)) | Distributed on giro services |
| Optical Character Recongition (OCR) - Return | OCR-costs are added to the cost of other services where number of transactions for each giro service is the distribution key: sum of direct and indirect costs service N) + (total costs of OCR File and Return) / ((number of transactions for instrument N) / (sum of all giro service transactions)) | Distributed on giro services |
| BankAxept (issuer) | W.A.C.for the service based on the 12 banks | BankAxept (issuer) |
| International debit cards (issuer) | W.A.C.for the service based on the 12 banks | International debit cards (issuer) |
| International credit cards (issuer) | W.A.C.for the service based on the 12 banks | International credit cards (issuer) |
| BankAxept (acquirer) | W.A.C.for the service based on the 12 banks | BankAxept (acquirer) |
| International debit cards (acquirer) | W.A.C.for the service based on the 12 banks | International debit cards (acquirer) |
| International credit cards (acquirer) | W.A.C.for the service based on the 12 banks | International credit cards (acquirer) |
| Transfers | W.A.C.for the service based on the 12 banks | Transfers |
| Deposits at the counter | W.A.C.for the service based on the 12 banks | Deposits at the counter |
| Night safe | W.A.C.for the service based on the 12 banks | Night safe |
| Deposits through cash handling companies | W.A.C.for the service based on the 12 banks | Deposits through cash handling companies |
| Deposits: Coins (bag, bulk) | W.A.C.for the service based on the 12 banks | Deposits: Coins (bag, bulk) |
| Deposits through automats | W.A.C.for the service based on the 12 banks | Deposits through automats |
| Withdrawals at the counter | W.A.C.for the service based on the 12 banks | Withdrawals at the counter |

| **Table A3.1 (cont):** How the 35 services in the bank survey is treated: only 26 services form the basis for the cost calculation. | | |
|---|---|---|
| **35 services from the questionnaire** | **How service is treated in analysis** | **26 services published in analysis** |
| Withdrawals at own banks ATM own customers | W.A.C.for the service based on the 12 banks | Withdrawals at own banks ATM own customers |
| Withdrawals at own banks ATM foreign customers | W.A.C.for the service based on the 12 banks | Withdrawals at own banks ATM foreign customers |
| Withdrawals at own banks ATM international cards | W.A.C.for the service based on the 12 banks | Withdrawals at own banks ATM international cards |
| Withdrawals at foreign banks ATM own customers | W.A.C.for the service based on the 12 banks | Withdrawals at foreign banks ATM own customers |
| Coin roll withdrawal | W.A.C.for the service based on the 12 banks | Coin roll withdrawal |
| CRS-automats (deposits, notes) | Not published due to poor data quality | Not published |
| Coin automated counters | Not published due to poor data quality | Not published |
| CRS-automats (withdrawals, notes) | Not published due to poor data quality | Not published |
| Change at the counter (coins and notes) | Not published due to poor data quality | Not published |
| Coin roll change automats | Not published due to poor data quality | Not published |

The weighted average unit cost was calculated based on the information from the 12 banks. Each bank calculated the total cost and the total number of transactions on each service offered. Transaction statistics per bank was partly collected from the regular reporting of payment statistics to Statistics Norway, partly on internal information. Each bank could then calculate their private unit cost per services offered. Each bank was also able to separate between direct and indirect cost, costs for services delivered by subcontractors and own production cost, and interchange fees for each service offered.

To calculate the weighted average unit cost, the sum of costs and sum of transactions from the 12 banks were used:

$$Weighted\ average\ private\ unit\ cost\ for\ service\ n = \frac{\sum Private\ unit\ cost\ for\ service\ n}{\sum Transactions\ for\ service\ n}$$

The banks gave data on number of transactions for the different services. Norges Banks' Annual Report on Payment Systems 2007 provided information on the total number of transactions for a number of payment services in Norway. Unfortunately, not all services offered by the survey banks were covered in the domestic statistics on payment services. This applied to 7 of 26 services offered. The 7 services were all cash handling services. To estimate the domestic number of transactions on these services, an average of the market share of the 12 survey banks were calculated on the 19 services where both domestic

statistics and banks' own information on number of transactions were available. The average market share was used to calculate an estimate on the domestic number of transactions for the remaining 7 services.

Also, two other approaches were considered when estimating the market share. We calculated the 12 banks' market share based on deposits on transaction accounts and based on total assets. Both estimates gave roughly the same market share as measured in number of transactions, so we chose number of transactions as our market share variable (to use data from the survey only). Number of transactions to the society is thus based on domestic statistics for 19 services. On the basis of transactions' market share for these 19 services, we calculated the market share for the remaining 7 services.

To calculate the private cost of cash, the survey included information on banks own and subcontractors' costs on deposits and withdrawals of cash. The private costs are calculated as:

$$Private\ costs = (Own\ production\ unit\ cost + Subcontractor\ unit\ cost) \times No.of\ withdrawals\ and\ deposits$$

The data necessary to make this calculation was collected from Norges Banks' Annual Report on Payment Systems 2007 and internal calculations on Norges Banks own production costs.

The bank survey showed banks' and subcontractors' costs in issuing and acquiring cards and costs for producing bill payment services. The private costs are calculated as:

$$Private\ cost = (Own\ production\ unit\ cost + Subcontractor\ unit\ cost) \times No.of\ transactions$$

Unfortunately, settlement costs in Norges Bank on retail payments are not available.

### Interchange fees

Banks pay interchange fees when their customers use other banks ATMs, or when their customers pay by card and giro to a merchant or institution and where the payee's bank is different from the payer's bank. To some banks the interchange fee is a net cost, to others it is a net income. This is a cost survey, so gross interchange fees were included as costs only. Each bank also provided information on their gross interchange income, but that

information is not used in the analysis. In sum, across all banks, the interchange fee should be zero, as the net costs for some banks equals the net income for other banks.

As we have information on the unit interchange fees paid for ATMs and giros from the banks' common agreements on payment system issues, and each bank also provided information on interchange fees for giros, cards and ATMs, it was relatively simple to eliminate interchange fees when making the calculation of total private costs to banks. This was done as follows:

ATMs:

The interchange fee in 2007 was NOK 6.90 per transaction for a withdrawal made in an ATM owned by a different bank than the cardholder's bank. That is: the cardholder's bank paid the ATM-owning bank NOK 6.90 per transaction done by the cardholder in the foreign ATM. 51.35 million transactions were done in a foreign ATM, which gave a total interchange fee of NOK 354.35 million to be subtracted from the sum of ATM costs calculated.

Giros:

For some of the giro services, the banks have agreed on an interchange fee, dependent on how the giro payee receives the payment. It is not, however,as simple to calculate this as for ATMs, since our survey framework primarily follows the behavior of the payer. The payers' actions will not always trigger an interchange fee, and it cannot be identified *when* an interchange fee is triggered in the information provided by the survey.

To solve this problem, we use the bank survey data for each giro service. The banks have paid these fees, and the individual bank has stated the cost distributed to each service in the survey response. For example: the interchange fee cost for Internet banking for retail customers is 5% of unit cost (weighted average across the 12 banks). These interchange fees were deducted from the sum of each giro service cost. The level of interchange fees ranged from 0.4 per cent to 8.2 per cent of the total cost of giro services.

Cards:

The banks paid interchange fees for different card services (other than ATM services). These were reported in the same manner as interchange for Giro, and subtracted from the total cost in the same manner.

### Unit cost calculation

Unit cost is calculated as a weighted average of the 12 banks costs for each service. The weighted average is calculated as the sum of costs for each service divided by the sum of transactions for each service. This was done for each of the 26 services.

### Direct costs

Direct costs are in principle costs generated by production of a specific service. The costs are mostly costs generated from banks subcontractors' activities, and the banks pay their subcontractors for their delivery. Data are collected from invoices. For a few items, costs are imputed, for example research and development (can be attributed to separate services) and credit cost (based on the credit cost banks carry for the credit card activities). The banks distributed the direct costs based on internal assessments, and were not guided as strongly as for the indirect cost setup in the questionnaire.

### Indirect costs

Indirect costs are costs not specifically generated by production of the different services. Indirect costs are generated by "in-house" activities.

In this survey we have decided to define one of the major items, salaries, as indirect costs. This is because most payment services are handled by central processors or are heavily computerized, and personnel in banks normally do not have any direct activities relating to the individual transaction. Even cash handling is very often handled by subcontractors, and are thus outside the bank. However, we are aware of differences within the 12 banks, as some of the personnel in the banks do some "direct" work relating to cash handling and payment services. We find this to be a minor part of the personnel cost (salaries), and as a simplification we choose to treat personnel as an indirect cost.

Most of the costs can be found in the financial accounts. Some costs are replaced with imputed values, for instance depreciation of machinery or buildings.

## Questionnaire and manual

Further details on the different items (costs, activities, services etc) are found in Gresvik and Haare (2009). The spreadsheet shows how costs are distributed to the different services according to the built-in distribution mechanisms (activities, number of transactions etc.). The manual and the spreadsheet form are a complete guide to make a response to the survey.

## Process

The 2007 bank survey was carried out in 2006-2008. The basis for the methodology was the survey conducted in 2001, and a planned cash handling survey constructed by the banks associations in 2006. Based on the information in these survey frameworks, we built a complete framework for mapping costs in payment services and cash handling in the banking industry in Norway 2007.

The decision to conduct a survey was made in 2006. An invitation was sent to 24 banks and 2 card acquirers. The invitation was sent from Norges Bank's Governor Svein Gjedrem to the CEO of each bank / firm in October 2006.

A meeting was held in Norges Bank in December 2006 for those banks/firms that had made a commitment to participate, and questionnaire and manual was sent to the participating banks/firms by Christmas 2006.

The respondents spent 2007 to register data, and responded by Q2 2008.

During 2007, there were extensive contact with the participants, via phone, e-mail and a website created for the purpose. All banks were also visited in autumn 2007.

Deadline for replying to the survey was originally set to February 1st, but few banks managed to meet this date. Responses were thus collected throughout the next months, the last one was sent in May 26th 2008. For all respondents, extensive quality improvements were made, and all handed in several improved versions (10, at most) of the original response. This dialogue concerning the results was very important to reach the desired level of quality to the data set.

After initial analysis, a meeting was held in September 2008 for the participants. Preliminary results were presented, and the participants made comments that were valuable to further improve the results. Some of the main conclusions from the analysis were presented at Norges Bank's Payment Systems Conference in November 14th 2008 (Gresvik and Haare, 2008b).

## Experiences

We consider the bank survey process to be a success. Even though it was voluntary to participate, the respondents showed a lot of commitment and delivered high-quality results. There are several reasons for this:

Norges Bank signaled early in the process that it considered the bank survey to be important, the letter of invitation was signed by the governor and sent to each bank's managing director.

The communication with the banks' associations was very good. The associations also had direct interests in parts of the results[46]. Even though the banks were presented a ready-made framework to be used for the survey, banks could make minor adjustments.

Data was collected throughout 2007. The quality of the information might perhaps been more or less the same if we had collected data for instance over a 6 months period and extrapolated it to a whole year.

Communication interface should be kept as simple as possible. In our communication with the banks we also used a web-based project management tool to create a private environment for communication. On the platform all the relevant documents were available. This tool was not extensively used by the banks. Rather, e-mail and secure e-mail were the preferred means of communication.

Quality control is important. Even though we had established a detailed framework, there were many questions. We therefore interacted closely and often with the banks to ensure that the replies met the desired quality level. This was considerably more time-consuming than expected.

[46] The banks' associations had themselves planned to carry out a survey of the costs of cash handling.

# Appendix to Chapter 5 Costs at merchants

## Results: Assumptions

The merchant survey covered cash and cards payments. 147 businesses or 696 outlets responded to the survey. Private unit costs were calculated on basis of five elements: infrastructure, amount, time, cash holdings and number of outlets per business.

To the merchant, costs are generated by investments in and rent for infrastructure items such as card terminals, tellers etc. Increasing value per transaction (amount) leads to higher costs, as the fee structure for some cards is dependent on value paid, while a larger value increases the cost of handling cash. In addition, time spent on receiving a payment carry a cost, as salaries and social costs are to be paid for the personnel. Holding cash has a lost-interest cost, since the cash could have been deposited on an account over night. Number of outlets increases costs of handling cash, as many outlets handle a relatively small amount each, compared to fewer, but larger outlets. For a business with many outlets, the cash transport has to make more stops, and cash handling can be arranged in a more efficient way in a large outlet than in a small outlet.

Based on the sum of these five elements, private unit cost per transaction was calculated. This was done for cash transactions and card transactions (BankAxept and international payment card schemes). Multiplying the unit cost for each instrument (*i*) with number of transactions in the society, and adding the values for the *n* (three) categories of instruments give:

$$\sum_{n}^{i} Merchants\ Private\ cost = Private\ unit\ cost\ \times No.of\ transactions\ in\ the\ society$$

Number of cash transactions was calculated as in the household survey, while number of card transactions was known from the payment statistics.

To make the calculation useful in the social cost calculation (Chapter 2), a separation between subcontractors' costs and own production costs had to be made. The merchant survey contains the information necessary to make this separation, supported by data from the ORBOF database.

The merchant survey showed information on merchants' costs on cash payments and merchants' costs on cash handling, bulk deposits and withdrawals. The time study gave information on how much time the customers and merchants spent on cash payments, per transaction on average. Merchants' private costs of cash were calculated as:

$$Private\ costs = Own\ production\ unit\ cost\ \times No.of\ transactions + Fees$$

The merchant survey showed information on merchants' costs on card payments. The time study in this survey gave information on how much time the customers and merchants spent on cards payments, on average per transaction. Merchants' private costs of cards were calculated as:

$$Private\ cost = Own\ production\ unit\ cost\ \times No.of\ transactions + Fees$$

Merchants face a very different price structure on BankAxept compared to international card schemes, which were reflected in the results from the survey. Also, the time study showed distinct differences in time spent on a signature-based transaction (57 seconds) and a PIN-based transaction (17 seconds).

Merchants and others pay bills, and according to our calculation in chapter 2, 52 % of bills paid are paid by the corporate market. Unfortunately, we do not have any information on routines for paying bills in the corporate market. The merchant survey did not focus on this matter. The only information we have accessible is the fees paid to banks for the bill payment service. Private costs calculated for merchants and other industries consist only of fees. Costs of time spent etc on paying is omitted. The costs calculated are therefore too low.

$$Private\ costs = Fees$$

Subcontractors to the merchant are banks, card acquirers and cash handling companies. Fees paid are found in the ORBOF statistics, and are also shown in the responses made by merchants (Table 25). Other fees are for example card terminal rent or cash transport.

Own production costs are based on time spent on handling cash and receiving cards and cash payments, time spent settling tellers, counting cash, in-house security, fraud, loss and insurance cost etc. Time cost is calculated as:

$$Cost\ for\ time\ spent\ on\ recieving\ payments$$
$$= Average\ salary\ including\ social\ costs\ etc$$
$$\times Time\ spent\ on\ recieving\ payments$$

Average salary is based on information from Statistics Norway[47].

The results show that salaries and fees based on payment value are the most important cost drivers to the merchants.

### Information from the merchant survey that are not used in our analysis

The merchant survey was designed to give an estimate of number and value of transactions, both on cash and cards use. It was also designed to be representative for Norwegian businesses and outlets, so that values from the survey could be multiplied by the corresponding statistics on businesses for Norway, and thus give an independent estimate on use of cash and cards at point of sale in Norway. Unfortunately, the response rate was too low to enable us to make these calculations. We had to settle for the estimate of transactions made in the household survey in combination with information from the payment statistics. That said, the quality of the household survey estimate is sufficient for our purpose.

## Process

In 2007-2008, Norges Bank conducted a survey among merchants on costs of handling payments. One question focused on how many payments the business received in the course of one month, the value, and how payments were made; cash or card. These answers could have provided a good basis for estimating payments at point of sale.

Unfortunately, the response rate to this survey was very low. Responses to some of the 14 questions were of poor quality. A few questions were answered properly, though, and can be used as indications when combined with other information. The responses from

[47] See http://statbank.ssb.no/statistikkbanken/temp/20081291438812294380 4AKINaer.xls and http://statbank.ssb.no/statistikkbanken/temp/2008129144148529438 04ArbKraftIndex.xls (average salary including social costs, paid by employer). Statistics per industry from 2000, indexed to 2007-values.

merchants are skewed, weighted too heavily on grocery chain stores compared to businesses in Norway on the whole. This leads us to believe that transaction data will be skewed towards small-value payments, and perhaps towards an overweight of BankAxept payments compared to other card brands as some grocery chains do not accept all card brands. In addition, Norwegians usually do not use credit cards or delayed debit cards when buying food.

When asking shops, hotels and restaurants etc. about costs relating to payments from their customers, we encountered obstacles that made us alter our original plan twice. Even though we put a significant amount of effort into this survey, we still feel uncomfortable using some of the results, due to a low response rate and low quality of the responses. Some of the information is quite robust, though, and can be used (with caution) in our analysis. Below, we show a record of our efforts to give an indication of the robustness of the numbers and to share our experiences when we tried to shed light on an issue which is of very little interest to most of the respondents.

Our POS study was inspired by similar studies carried out by the Dutch and Belgian central banks.

When constructing the survey, we had numerous consultations with HSH (The Federation of Norwegian Commercial and Service Enterprises) and NHO Reiseliv (Norwegian Hospitality Association). We assumed that the bulk of the respondents would be organised in one of these organisations. We also conducted a pilot study among some of the members of these organisations, to test and improve the quality and relevance of the questions. The survey was administered by Norges Bank.

*Plan A:*

To draw a statistically valid sample, we contacted Statistics Norway. We defined the statistical codes of the different industries that we wanted in our sample. The total population consisted of 128 141 enterprises. Most of these enterprises were very small. The sample drawn consisted of 2 996 enterprises. In order to avoid too many very small enterprises in the sample, our drawing procedure was as follows:

The population was divided by industry and size (the number of employees). The likelihood of being drawn was constant within each industry. The likelihood of being drawn increased with the number of employees. The likelihood was twice as large for enterprises with 0 to 3 employees as for enterprises where we had no information on the number of employees (normally one-person entities). The likelihood of being drawn doubled for enterprises with 4 to 19 employees compared to enterprises with 0 to 3 employees. The likelihood was again doubled for enterprises with more than 20 employees compared to enterprises with 4 to 19 employees.

The questionnaire was sent to the respondents in late autumn 2007. It was accompanied by a letter from the governor of the central bank which emphasised the importance of this survey to society. We also attached a letter from HSH and NHO urging their members to respond. Enterprises participating would at a later stage receive the results of the survey so that they could compare their own submitted information to the average for all respondents.

The response to the questionnaire was indeed far from good. Even though we reminded the businesses about our questionnaire by letter and phone, the total number of enterprises responding was only 122, representing 155 businesses, far from being satisfactory for our purposes.

*Plan B:*

To improve the data, we selected 40 large members from HSH and NHO. Even though our hopes were high for a better response rate this time, we had to work hard for this.

The data from Plan B was added to the data from Plan A. Disappointingly, even the combined Plan A + B consists only of 147 respondents, covering 696 businesses. This is better, but not as good as it should be to make a proper statistically reliable analysis.

*Plan C:*

Working with the data collected we discovered that the time spent by the customer to pay at the cash register was substantially greater for all payment instruments than in similar surveys from the Netherlands and Belgium. We suspected that the respondents' degree of accuracy on these questions was low. We therefore conducted a special study, collecting

detailed information from 8 different businesses on time spent on payment transactions. 559 cash transactions, 401 debit card transactions and 103 credit card transactions were recorded. The results showed that the time used to perform the payment operation were in line with our expectations, and even lower than what was recorded in the surveys in Belgium and the Netherlands.

## Questionnaire

The questionnaire was developed to take into account all potential cost elements relevant for cash handling and payments. Of course, not all items were relevant for all respondents, but overall the form enabled us to obtain the necessary information for the analysis. See Gresvik and Haare (2009).

### Experiences

We can see a couple of reasons why the response rate was low.

First, our questionnaire had a many questions asking for detailed and complex financial information. The response rate would perhaps been better if the questions had been of the "yes-no" type or giving qualitative assessments to a number of statements, or if we had made visits to a sample of merchants, collecting information on-site.

Second, the result would perhaps also have been better if the merchants associations had been directly involved in the survey. Even though we had very good support from the associations, they were not directly a part of it.

We put a lot of effort in trying to convince the merchants to answer the questionnaire, but did not succeed very well. The reason might be that payment costs is not considered to be a big element in merchants' total costs.

# Appendix to Chapter 6 Household costs

## Results: Assumptions

The household survey covered use of cash and cards payments. There is information accessible that enables us to calculate households' private costs on cash and cards payments. Making assumptions on time spent paying giros and withdrawing and depositing cash made it possible to calculate households' private costs for these activities as well. The calculation of households' costs is thus fairly complete. The calculation of costs is based on a set of assumptions, and on the calculation of payment transactions elaborated below.

The household survey gave information on number of cash payments in the society, calculations are shown in Gresvik and Haare (2008a). Based on accessible information, we calculated the households' private cost of paying, depositing and withdrawing cash as follows:

$$Private\ cost\ of\ paying\ using\ cash$$
$$= Time\ spent\ on\ a\ cash\ payment \times (Average\ salary - Tax)$$
$$\times No.\ of\ transactions + Fees$$

$$Private\ cost\ of\ withdrawing\ cash$$
$$= Time\ spent\ on\ a\ cash\ withdrawal \times (Average\ salary - Tax)$$
$$\times No.\ of\ transactions + Fees$$

$$Private\ cost\ of\ depositing\ cash$$
$$= Time\ spent\ on\ a\ cash\ deposit \times (Average\ salary - Tax)$$
$$\times No.\ of\ transactions + Fees$$

Time studies on paying using cash were collected from the merchant survey. Average time spent on a cash payment was 16 seconds. Time spent on cash withdrawals from ATM was assumed to be 110 seconds, split on 60 seconds in queue / shoe-leather cost and 50 seconds spent on the withdrawals itself (Bergman et al. (2007)). Time spent on cash withdrawals over the counter were assumed to be 180 seconds, split on 60 seconds in queue / shoe-leather cost and 120 seconds spent at the counter. Time spent on cash deposits over the counter

were assumed to be 180 seconds, split on 60 seconds in queue / shoe-leather cost and 120 seconds spent at the counter.

Average salary in society is based on statistics from Statistics Norway[48]. Average tax in Norway is assumed to be 28 per cent on income.

Number of transactions is based on Norges Bank's statistics (withdrawals), the bank survey (deposits) and on the household survey (payments).

The household survey gave information on the use of cards. This information was checked against the domestic statistics on card use. Based on these two sources, the number of transactions was calculated (see Gresvik and Haare, 2008a for details). Based on the number of transactions, time spent and fees paid, households' private costs were calculated.

$$Private\ cost = Time\ spent\ on\ a\ card\ payment \times (Average\ salary - Tax) \times No.of\ transactions + Fees$$

The household survey gave no information on bill payments. However, information on use of bill payment services (giro) and fees paid for using these services were available.

Norges Banks' Annual Report on Payment Systems 2007 provides statistics on the use and values paid in tables 10 and 14. A problem for the use in this analysis is that there are no split on retail market and corporate market for other solutions than Internet banking. We made the assumption that the same distribution between the two markets for internet banking is valid for other bill payments. This gave households a 48.4 % share of the bill payments, measured by number of transactions.

Households generally pay fees for using bill payment services. The distribution of fees is explained in annex to chapter 2.

The survey provided no information of the time spent on paying bills. To make calculations on costs, we therefore assumed that time spent on a bill payment is 60 seconds, on average. The private costs to households of bill payments were calculated as follows:

$$Private\ cost = Time\ spent\ on\ a\ bill\ payment \times (Average\ salary - Tax) \times No.of\ transactions + Fees$$

[48] See: http://www.ssb.no/emner/06/05/lonnansatt/tab-2008-06-19-01.html

The main findings in the household survey were domestic use of cash and cards by residents and non-residents. As explained in Gresvik and Haare (2008 a and b), the number of payments using cash and cards at point of sale rests on a couple of assumptions. These assumptions are repeated here.

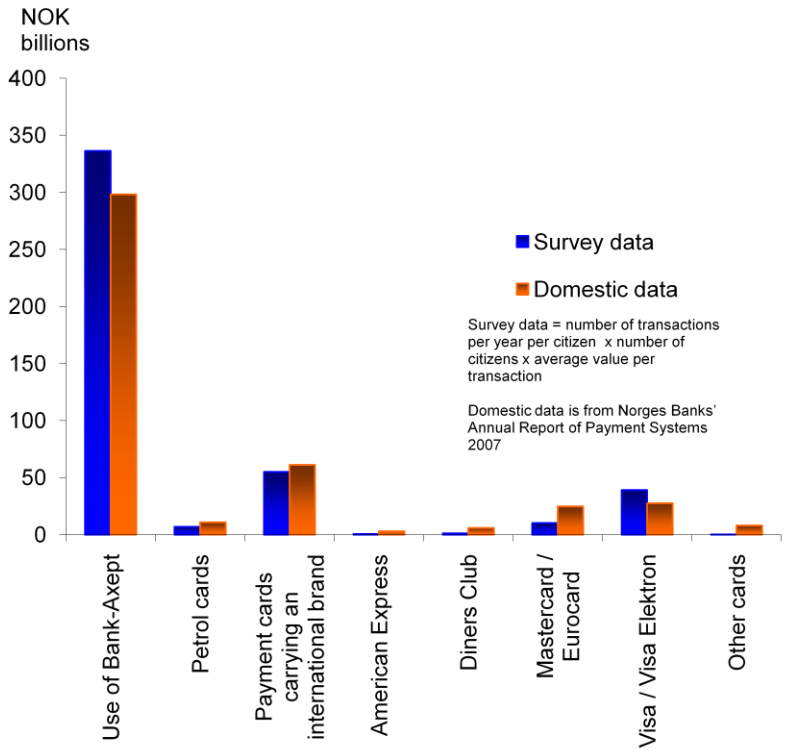
## Altering survey data

The data in the survey agree rather well with statistics on card use in Norges Banks' Annual Report on Payment Systems 2007. However, we have chosen to make changes in the data set in the survey for a particular relation: the number of VISA transactions in the survey is apparently overestimated by 40 percentage points compared to domestic data[49], while the number of transactions based on BankAxept cards (the domestic debit card solution) is underestimated by 38 percentage points.

A probable explanation is that most physical plastic cards issued in Norway are combined cards, and the combination Visa / BankAxept is by far the most common. The Visa logo is on the front of the card, while the BankAxept logo is on the back. When the card is used in a card terminal which accepts BankAxept, the BankAxept card function is used by default. Visa is a well-known brand, and BankAxept is not. In a survey conducted by BBS (the owner of the BankAxept brand), only 15 % of the respondents recognised the brand to be related to payment cards. Most cardholders thus believe they have a Visa card, while the truth is that they have a BankAxept card for payments. We believe this is a just cause for adjusting the data from the survey, and we will use the adjusted data set in our analysis.

[49] Domestic data is from Norges Bank's *Annual Report on Payment Systems 2007* and includes all transactions in Norway.

# Illustration A6 1: Payment cards by residents at point of sale in Norway 2007




The average value of card payments in the survey differs from the average value of card payments in domestic data. We believe this is due to the low number of observations for some of the brands. In the domestic data set, average value is higher for international brands of payment cards than for the survey data set. We believe this is due both to a limited number of observations in the survey and because the respondents did not include businesses. When businesses use international cards, the value of the purchases is typically higher than when private individuals use the same cards. We therefore assume that the survey gives a relatively correct picture of cash use in the society. As an example, we had only two observations based on American Express cards in the survey. The value of these two transactions can hardly be representative for an average payment in Norway for such cards. This is a weakness in the survey data set which is difficult to compensate for and leads us to recommend caution when interpreting the results. There were a relatively high number of BankAxept observations, and the average BankAxept payment is closer to what is found in the domestic statistics.

### Residents, non-residents, and residents travelling

The survey only covers people living permanently in Norway (residents). In our calculations, we make the assumption that residents and non-residents have the same pattern of use of cash and cards.

## Process

The household survey was conducted by phone to a representative sample of Norwegians 16 years and older. 2608 persons responsed, of these 1201 replied to all 9 questions. 8 questions in the survey covered households' access to cash and deposits, while the 9$^{th}$ question covered payments using cash and cards.

The survey was conducted through the third week of September 2007. This week was chosen as it was a week that was "normal" in payment systems terms (no major holidays, tax payments, welfare payments etc), so that it could be used as basis for calculating annual values for 2007.

The survey was conducted as an omnibus type, that is: the market analysis company (Norstat) made calls every day through one week, asking questions about what the respondent did the previous day.

The questionnaire was developed on basis of a similar survey done by Norges Bank in 1993, a similar survey conducted by the Belgian Central Bank, and coordinated towards the banking and merchant survey questionnaires in this memo.

## Experiences

The household survey gave proper data material and met the desired quality level, and we consider it to be a success.

When constructing such a survey it is important that the questions are clear and not equivocal. Before interviewing the interviewers should have a minimum knowledge about the topic and the background. We therefore had an information session with the interviewers before they started calling respondents.

If the survey in any way should be supplemented, we could perhaps have had questions on what the households consider to be their costs of paying. To this end we used information from other sources in our calculations.