

**INCENTIVES AT THE COUNTER:  
An empirical analysis of surcharging card payments and payment behaviour  
in the Netherlands**

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**Abstract**

In card payment systems, no-surcharge rules prohibit merchants from charging consumers extra for card payments. However, Dutch retailers are allowed to surcharge consumers for their debit card use. This allows an empirical analysis of the impact of surcharging on the demand for debit card services, and the effect of abolishing the no-surcharge rule on card acceptance by retailers and consumer payment choice. Based on consumer and retailer survey data, our analysis shows that surcharging steers consumers away from the debit card towards cash. Half of the difference in the shares of debit card payments in total payments across retailers can be explained by this surcharge effect. First calculations show that removing the surcharge on debit card payments in the Netherlands may induce considerable social cost savings of some EUR 100 million in the long run.

Keywords: survey data, retail payments, no-surcharge rule, cost efficiency  
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**1 INTRODUCTION**

The retail cards payments industry is subject to increasing attention by economists and policymakers. This has led to a surge in the theoretical and empirical literature on the

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“economics of payments”. At the centre of this literature is a debate about the pricing of payments using credit and debit cards. Merchant dissatisfaction with interchange fees and merchant service charges for card payments have triggered antitrust scrutiny and resulted in some “spectacular” antitrust cases in for instance Australia, Europe and the US.<sup>2</sup>

According to economic theory, a card network derives the optimal prices for consumers and merchants by maximising its objective function (for instance its profit function). These optimal prices may not cover the bank costs at one side of the market. In order to stimulate participating banks to set ‘optimal’ prices it also sets an interchange fee which reallocates the costs of a payment transaction between the consumer’s bank and the merchant’s bank. By doing so the card network influences the prices of payment transactions for end-users, which in turn affect the payment behaviour of consumers and the acceptance decisions of payment instruments by merchants in the desired direction. This way, the cost of card payments is hidden from most consumers, because card schemes do often not allow merchants to pass on these charges to the consumer by surcharging card payments. These contractual agreements between card schemes and merchants are commonly known as the “no surcharge rule”. This rule has come under pressure by antitrust and competition authorities. Indeed, the Reserve Bank of Australia has eliminated the no-surcharge rule and the European Commission is of the opinion that the no-surcharge rule harms competition at the retailer level.

In the Netherlands, cash and the debit card are the most intensively used payment instruments. In contrast to many countries, Dutch retailers are allowed to surcharge consumers for (card) payments.<sup>3</sup> A large minority of retailers - mostly small shop owners - surcharges consumers for debit card payments. Hence, the Dutch retail payments market allows a useful “economic experiment” to assess the possible impact of removing the no-surcharge rule on acceptance and surcharge behaviour of retailers and on consumer payment choice. Our paper tries to examine the effects of surcharging card payments, whether surcharging leads to possible under- or overprovision of card services, and to assess the impact of surcharging on the total costs of the point-of-sale (POS) payment system. Furthermore, we also pay attention to what type of retailers choose to surcharge card payments and what type of consumers react to debit card charges. We use two unique sets of data, especially designed to gain insight in the extent to which Dutch retailers surcharge their customers and its impact on payment behaviour. The first set is a DNB Household survey which was held in the autumn of 2006 among approximately 2000 households. The second set is a NIPO survey, held in the same period, among 1000 Dutch retailers. This way we are able to confront both sides of the market, identifying possible correlations and feedback mechanisms.

This paper is structured as follows. Section 2 provides an overview of the theoretical and empirical literature on payment pricing and surcharging card payments. Section 3 describes the characteristics of the Dutch POS payment system, its costs structure and the tariffs structure Dutch banks employ to charge consumers, merchants and business clients for payment transactions. Section 4 discusses the set-up of the surveys and the collected data. Section 5 provides some descriptive statistics on payment behaviour of consumers

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<sup>2</sup> Interchange fees are fees that banks charge each other for the execution of a card payment. In practice, the level of the interchange fee largely determines the level of the merchant service charge.

<sup>3</sup> In principle, Dutch retailers may also surcharge cash payments. Since cash payments are often more costly to businesses than debit card payments (Brits and Winder, 2005) surcharging them and not debit card payments may provide consumers incentives to pay cost efficiently.

and the payment instrument acceptance and usage of surcharging by retailers. Attention is also paid as to how retailers surcharge and how consumers react to such charges. Section 6 compares the payment behaviour of consumers in stores with and without surcharges and provides estimation results on the impact of surcharging on debit card usage. It also discusses what type of consumers react to price signals and surcharges. In addition, an illustration of potential cost savings is presented resulting from an increased substitution of cash by debit cards when retailers remove the debit card surcharge. Finally, section 7 summarizes and concludes.

## **2 SURCHARGING CARD PAYMENTS AND PAYMENT PRICING**

### **2.1 Payment pricing: a theoretic overview**

Pricing payment instruments is a complex matter because payment networks give rise to large economies of scale and various types of externalities. These factors have led to significant concentration in the retail payment industry. At the core of theoretical literature on the industrial organization of the payments market is a debate about what economic principles should guide payment pricing, in particular the pricing of card payments. The observation that the payment industry is a two-sided market has stressed the fact that in setting payment prices, banks need to get both consumers and retailers on board by pricing both sides of the market in an effective way.<sup>4</sup> Hence, under two-sidedness, payment providers need not only choose a total price for their payment services, but also an optimal price structure between consumers and retailers. The ability (or not) to surcharge card payments by the merchant affects the price structure, and therefore the total demand of card payment services.

While there seems to be a widespread agreement that electronic payment instruments induce greater efficiency, card-based payments in particular have in many cases remained more expensive for merchants than their paper-based equivalents or cash. The price of cash and card payments are effectively hidden from consumers. Bank often charge card holders only fixed periodical fees but no transaction fees and merchants themselves also do not price differentiate between payments with different payment instruments. It may be the case that they would like to surcharge card payment instruments but that contractual agreements between card providers and merchants prohibit them from charging extra for card payments. These contractual agreements are dubbed the so-called “no-surcharge rule”. Instead the cost of card payments is reflected in the merchant service charge (or merchant discount), that is the transaction fee that the merchant pays to the acquiring bank (4p-party scheme) or the card company (3-party scheme). It is often argued that lifting the no-surcharge rule - so that merchants can charge differential prices for card and cash payments - is an alternative mechanism for internalizing (participation) externalities between merchants and cardholders in a two-sided market, like the interchange fee is a mechanism to guarantee the participation of all parties to the card payment system.

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<sup>4</sup> See Kahn and Roberds (2007) for a broader discussion on payment economics. The reader is referred to seminal papers by Rochet and Tirole (2002, 2003 and 2006) and Armstrong (2006) for a general introduction to the theory of two-sided markets.

Rochet and Tirole (2002, 2003) have shown that the price structure (and therefore also the interchange fee) becomes irrelevant if merchants charge different prices for cash and card payments. In a fully-fledged model of an imperfectly competitive payment card industry, and taking account of two-sidedness, they compare privately optimal and socially optimal payment prices (and corresponding interchange fees). With respect to Baxter's (1983) initial analysis, two important features of the payment market are added: imperfect competition between issuers and strategic behaviour of sellers.<sup>5</sup> For tractability, they assume perfect competition among acquirers, merchants' homogeneity, and an exogenous total payment volume. Under a no-surcharge rule and homogeneity of merchants, the model is solved by observing that the merchant service charge is as high as possible, but consistent with all merchants (just) accepting. This mechanism in which merchants are kept indifferent between accepting cards and refusing and accepting cash instead, determines the profit maximizing interchange fee. In this way, since the issuer's profits are increasing in the interchange fee, the cardholder fee is kept as low as possible, boosting demand for card services. The socially optimal cardholder fee (and interchange fee) follows from equating the fee to the social value of the payment externality imposed by the cardholder on the rest of the economy, i.e. on the issuers, acquirers, and merchants. In general, the socially optimal cardholder fee is higher than the profit-maximizing fee as long as accepting cards provides a competitive edge for merchants over their competitors who only accept cash. Hence, there is generally excessive use of card services. The resulting heavily skewed pricing structure is a general finding in two-sided markets.<sup>6</sup>

When the no-surcharge rule is lifted and sellers can costlessly surcharge, they never benefit from refusing card payments. At the optimum, merchants charge an additional amount equal to their merchant service discount minus (incremental) convenience benefit. This extra amount is effectively added to the cardholder fee, and therefore the total price of card services is entirely borne by consumers. With perfect surcharging (and no transaction costs), total card payment volume only depends on total prices and not on price structure anymore. Similarly, the net margin of issuers only depends on total price and total cost, so that the level of the interchange fee ceases to play any role.<sup>7</sup> Moreover, because of imperfect competition, issuers have positive margins, implying underprovision of card services.

Rochet and Tirole (2003) conclude that under costlessly surcharging, lifting the no-surcharge rule may or may not increase welfare, depending on issuers' market power and merchant resistance to accept cards. In particular, when issuers' market power is large than banning the no-surcharge rule is likely to be welfare decreasing due to an aggravation of under-usage of card services. On the other hand, when sellers' resistance is strong so that interchange fees cannot be set too high, banning the no-surcharge rule is likely to be welfare improving because it can act as a countervailing force to initial overprovision. Note that both situations (with or without a no surcharge rule) generally induce inefficient card use. Wright (2003) extends the analysis of Rochet and Tirole (2002) by looking at

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<sup>5</sup> Baxter (1983) was the first to recognize that inefficient card use can be corrected by imposing an appropriate interchange fee.

<sup>6</sup> Bolt and Tieman (2008) offer an explanation for extremely skewed pricing in two-sided markets based on the fact that some demand functions that are well-behaved in an ordinary one-sided context yield non-concave profit functions in some two-sided models, thus making corner solutions (e.g., prices of zero) optimal.

<sup>7</sup> Gans and King (2003) have established that this neutrality of interchange fees is a general property when costlessly surcharging is feasible.

alternative specifications of sellers' competitive behaviour. He concludes that if sellers are monopolistic, the no-surcharge rule partially corrects the underprovision which occurs under perfect surcharging. When monopolistic merchants are allowed to surcharge, they extract "too much" surplus ex post from card customers with higher prices for card purchases resulting in lower welfare than when merchants set one price. If sellers are perfect competitors the no-surcharge rule has no impact on card payment volumes or social welfare.

Another approach is provided by Bolt and Chakravorti (2008) who do not assume exogenous (ad hoc) convenience benefits from using a payment card. The premises of their model are "security" (or any opportunity cost attached to carry or use cash) and "income uncertainty" that drive consumers and merchants towards the use and acceptance of cards rather than cash. Given security and income uncertainty, induced merchant acceptance of cards and (fixed) cardholder fees determine the decision of consumers to have a payment card in their wallet. In turn, merchant acceptance is determined by merchants' cost structures, the ability to pass on costs, and the level of merchant discounts. Ultimately, in solving the model, both consumer usage and merchant acceptance decisions are a function of only the merchant fee that the bank sets. Their model predicts that imposing the no-surcharge rule increases bank profits, when merchants are not able to fully pass on payment cost to the consumer.

## **2.2 Payment pricing: an empirical overview**

There is limited empirical literature on the influence of payment pricing, and surcharging in particular, on the usage of payment instruments. In the area of retail payment systems, most studies have focused on the issue of consumers' choice of payment method, with a particular emphasis on the shift from paper to electronic payment methods. Due to a lack of transaction data, most studies of retail payments have tried to infer consumer payment behaviour from household surveys. Studies employing such surveys (Boeschoten and Fase 1989, Boeschoten 1992, Kennickell and Kwast 1997, Stavins 2001, Hyytinen and Takalo 2004, Loix, Pepermans and Van Hove 2005, Bounie and François 2006, Klee 2006a, Mester 2006, GfK/Currence 2007, Jonker 2007) have established that demographic factors such as age, income, and education strongly influence consumers' payment choices, and have documented the shift towards electronic means of payment in recent years. Zinman (2006) uses data from the Federal Reserve Board's Survey of Consumer Finances to infer that debit card use is more common among consumers who are likely to be credit-constrained.

Another approach in the literature has been to infer consumer choices from aggregate data on payment systems and data from industry sources. Among the papers in this literature are Humphrey, Pulley and Vessala (2000), Humphrey (2004), Garcia-Swartz, Hahn and Layne-Farrar (2006a, b), Jonker and Kettenis (2007) and Bolt, Humphrey and Uittenbogaard (2008). In particular Bolt et al. (2008) use the experience of Norway (which directly prices its payment services to consumers) and the Netherlands (which did not) over the time period 1990-2004 to try to determine what the incremental effect of transaction pricing may be on the adoption of card payments and electronic bill payments versus ATM withdrawals and paper-based giros. Overall they find that payment pricing induce consumers to shift more rapidly to more efficient payment instruments. However,

non-price attributes and terminal availability may play an even bigger role than payment pricing for point of sale payments.

While these analyses have been informative, their lack of transaction-specific data has limited researchers' abilities to model the microeconomic behaviour of consumer. This shortcoming has been partially addressed in some recent studies that make use of surveys more specifically targeted at consumers' and merchants' perceptions and acceptance of various modes of payment. Hayashi and Klee (2003) use data from a survey by the American Bankers Association to link consumers' use of electronic means of payment with their use of other information technologies. Loix et al. (2005) find similar results using data from a Belgian survey. Jonker (2007) analyzes data obtained in a survey in the Netherlands, indicating that consumers appreciate the safety, convenience and transaction speed of the debit card whereas they regard cash as a cheap payment instrument. They find the debit card relatively expensive compared to cash because some merchants surcharge debit card payments. In a specific survey regarding the effects of banning the no-surcharging rule in Sweden by IMA Market Development (2000), commissioned by the European Commission, the results show that lifting the no-surcharge rule has had only a marginal effect on merchant acceptance of credit cards. The vast majority of merchants connected to Visa and MasterCard would most probably have joined the card payment systems anyway, regardless the abolishment.

Recent papers by Borzekowski and Kiser (2006) and Borzekowski, Kiser and Ahmed (2007) combine the two prevalent approaches in the empirical literature. They are able to estimate demand functions for various methods of payment, using data from the Michigan Survey (demographic data plus consumers' attitudes toward different types of payment) with data on the "average" characteristics of certain payment types (electronic versus paper, time of use, bank fees, etc.). Borzekowski et al. (2007) examine the reaction of consumers on bank imposed transaction fees for PIN debit card payments. The motivation for banks to do so is that they want to encourage consumers to use signature based debit instead of PIN debit because of the higher interchange fees of signature debit payments. About 15 percent of the US banks charge PIN debit card transactions. The average fee level is 75 dollar cents, or 1.8 percent of the transaction amount. It turns out that bank imposed PIN debit card charges has lead to a 12% reduction in debit card usage. They also find that the frequency of use is unaffected by neither the imposition of transaction fees nor by the level of the fees. They expect that if merchants would surcharge the magnitude of the effect on debit card usage may be even stronger, since consumers are directly confronted with additional costs when they make their purchase rather than being charged later in time.

Only a few empirical studies of retail payments have been able to use transaction data, some notable examples being Klee (2004, 2006b), Fusaro (2006), and Rysman (2006). Using data provided by a grocery retailer, Klee finds that a major determinant of consumers' payment choice is simply transaction size, with cash being highly favoured for small-value transactions involving just a few items. Analysis of the same dataset indicates a marked transaction-time advantage for debit cards over cheques, helping to explain the recent popularity of the former. Fusaro (2006) applies a sample of bank accounts to examine behavioural explanations for consumers' preference for debit over credit card transactions. Rysman (2006) uses data collected by Visa to determine that while consumers may hold multiple payment cards, in practice they tend to concentrate card payments on a single card network.

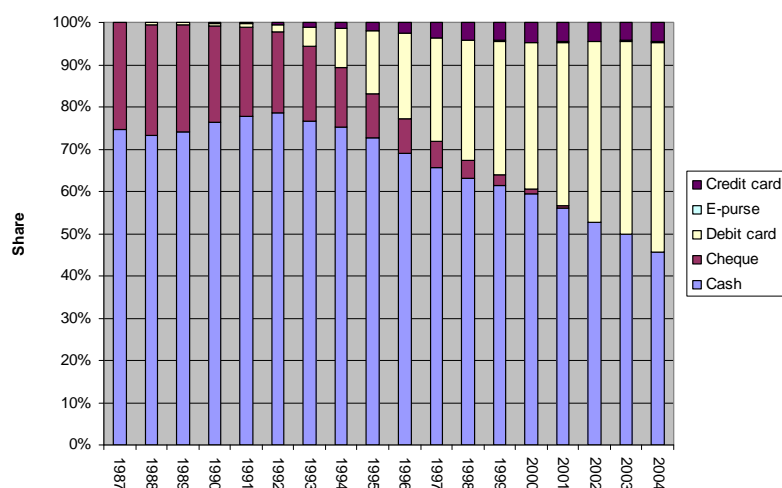
### 3 THE DUTCH POINT-OF-SALE PAYMENT SYSTEM

#### 3.1 Paying in the Netherlands

Dutch consumers mainly use cash and the debit card for POS payments. Over the last two decades, the Netherlands has seen a rapid shift from cash and paper based payment instruments to electronic payment instruments. The driving force behind this “electronic revolution” is the debit card. The bulk of point-of-sale retail transactions is still effected in cash, with more than 5 billion cash payments (EIM, 2007) against 1.6 billion debit card payments in 2007 (Currence, 2008). The Dutch e-purse (Chipknip) and the credit card follow at a distance with 175 million and 30 million transactions respectively. However, looking at the value share of the payment instrument in total POS sales than it turns out that the debit card has surpassed cash from 2004 onwards (see figure 1).<sup>8</sup> Debit cards are linked to the current account of its owner and are generally granted a credit line.

The Dutch often use cash for small purchases whereas they pay with their debit card when the transaction amount is relatively high, like at gas stations, clothing stores, home improvement stores and supermarkets (see table 1). There are several reasons to explain this behaviour. First, in the past public campaigns promoted the usage of debit cards for higher transaction amounts. Second, in some branches many retailers only accept cash payments and third surcharging debit card payments when the transaction amounts are low (below EUR 10-15) is quite common (see also section 4).

Figure 1 Value shares of POS payment instruments  
(in percentages of total value of POS payments)



Source: Jonker and Kettenis (2007)

<sup>8</sup> The value of cash transactions has been approximated by subtracting the value of card payments from total sales at POS locations.

Table 1 Estimated shares of cash and debit card by transaction amount (in 2006)  
(in percentages)

Transaction amount	Cash	Debit card	Other
< EUR 5	84	5	11
EUR 5-10	82	16	1
EUR 10-15	69	29	2
EUR 15-20	54	44	2
EUR 20-60	36	62	4
> EUR 60	20	75	5

Source: GfK/Currence (2007).

### 3.2 Dutch debit card payment system

The Netherlands has a national debit system (PIN) that was developed by the Dutch banks in the late 1980's. Consumers use the debit card to withdraw cash from ATMs and to effect debit card payments at points-of-sale. Dutch banks have co-branded their debit cards with Mastercard's international debit card scheme Maestro in order to facilitate cross-border usage. Some banks also issue PIN-only debit cards which can be used in the Netherlands exclusively.

Interpay, the Dutch Automated Clearing House (ACH) was owned by the Dutch banks. Interpay used to be responsible for acquiring, processing payment transactions and scheme management. In the past few years the banks reorganized Interpay. In 2004 banks took over the acquiring activities and Interpay has increasingly focused on processing payments. As part of the restructuring, a new organization, Currence, has been set up. Currence is the scheme owner of Dutch electronic payment instruments such as the debit system PIN. In 2006 the Dutch Interpay and the German ACH Transaktioninstitut für Zahlungsverkehrsdienstleistungen merged, resulting in the establishment of Equens, a pan European payment processor.

At end-2006, several Dutch banks made bilateral agreements on interchange fees for debit card payments. Earlier on, Dutch banks attempted to arrange a multilateral interchange fee for debit card payments within the Netherlands but withdrew their request following an informal decision by the Netherlands Competition Authority (NMa). The NMa finds that when there is just a small number of issuers, as is the case in the Netherlands, it is perfectly feasible for banks to reach bilateral agreements on the compensation for processing and authorisation costs.

### 3.3 Cost and tariff structure of Dutch POS payment services

#### *Costs and benefits*

Total costs of payment systems and services to society are considerable and there is much to be gained by designing them efficiently. Brits and Winder (2005) provide an overview of the (social) costs of retail payments in which they include costs of the banking industry, the retail sector and the central bank. They estimated the costs in 2002 of all POS payments (cash, debit cards, credit cards and stored value cards) at EUR 2.9 billion, 0.65%

of Dutch GDP.<sup>9</sup> The costs of retail payments varied in transaction amount and payment instrument. Focusing on the most used payment instruments, cash and debit card, paying in cash was socially preferable when the transaction amount was lower than EUR 11.63, otherwise paying by debit card was more efficient. This information is essential in assessing the optimality of payment card usage regarding under- or overprovision of card services.

The used cost data includes the expenditures for producing payment instruments, the construction and maintenance of the payment infrastructure and of processing payments. Brits and Winder made a distinction between fixed and variable costs per additional transaction and per extra euro sales.<sup>10</sup> By doing so, payment instrument specific cost functions were retrieved (see figure 2), showing the costs for making an additional payment with a particular payment instrument.<sup>11</sup> The variable costs depend on the costs involved with one extra payment transaction (the intersection of the cost function with the y-axis),

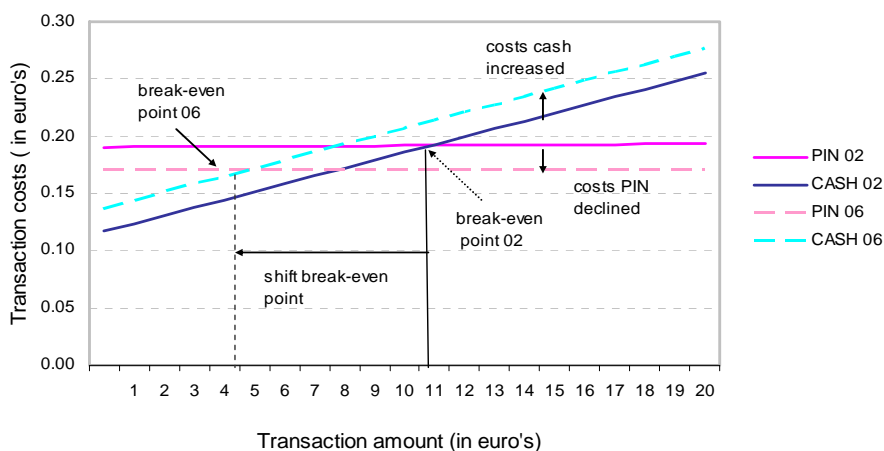
Figure 2 Impact changes in variable costs of an additional transaction by cash and debit card on break-even point (2002 vs. 2006)

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<sup>9</sup> Brits and Winder (2005) focused on the costs of POS payment instruments, made by banks, the Nederlandsche Bank, the merchants, the Dutch payment processor Interpay and credit card companies. Their study does not include costs incurred by consumers. That way they cover a large part of the social costs of the POS system, but not all costs. For instance shoe-leather costs made by consumers to get cash from an ATM are not included. However, in the remainder of this study we will follow Brits & Winder and refer to the costs of POS payments made by businesses as social costs.

<sup>10</sup> The fixed costs are related to costs that are not affected by carrying out a specific transaction or by the sales amounts thus generated, like investments in the payment infrastructure.

<sup>11</sup> Note that the cost structure and relative costs of using the two payments instruments is probably not the same for all parties in the payment chain, and can even differ between businesses within the same part of the chain (e.g. merchants). As the break-even point between cash and debit card can differ between parties they may favour different payment instruments and encourage their customers to pay in accordance with their own preferences.



like data-communication costs made for the authorization of a card payment, and on the costs related to the transaction amount (the slope of the cost function), like counting banknotes and coins or safety related expenditures. The cost functions were used to determine which payment instrument is most cost-efficient for which transaction amount. A debit card payment turned out to cost about EUR 0.19 and was cheaper than paying in cash if the amount paid is EUR 11.63 or higher. Given recent, rapid technological developments, especially in telecommunication and IT, the costs of making electronic payments have declined considerably since 2002. Therefore, we calculated new cost functions for cash and debit card using new information for 2005 on the costs for banks from the McKinsey study (2006) and cost data for 2006 for the retail and catering industry from a study by EIM (2007). They have been used in section 6 for assessing the impact of a stop on debit card surcharging by merchants on the social costs in three scenarios.<sup>12</sup> It turns out that the costs of debit card payments have declined during the past few years whereas the costs of cash have increased, shifting the break-even point of debit card payments versus cash payments to the left. The transaction amount above which debit card payments are less costly than cash payments has more than halved in five years' time. The changes in costs have a large impact on the break-even point because of the modest slope of the cash cost function. This makes the break-even point very sensitive for small changes in costs of either cash or the debit card, as can be seen from figure 2.

#### Tariff structure POS payments

Consumers and retailers face different tariff structures for using payment instruments (see Bolt 2006). Tariffs for retailers are directly linked to the use of payment instruments through a differentiated system of payment packages, explicit fees and charges depending on the number of payment transactions. Commercial rates for electronic payments do not

<sup>12</sup> In this study we followed the approach in Brits and Winder (2005) when we updated the 2002 cost figures. We used these updated cost data for the scenario-analyses in section 6. That way we could provide assessments of costs savings for business market parties in the payment chain.

depend on the value represented by the transactions, whereas tariffs associated with cash payments do depend on the value. With respect to PIN debit card payments acquiring banks now impose a transaction charge on retailers of around 4-5 euro cents for each incoming debit card payment, although (very) large retailers usually pay less (see NMa, 2005). Dutch consumers are hardly confronted with the costs of their payment behaviour at the counter. For them, the use of payment instruments seems to be "free". Banks usually charge them a fixed, periodical fee for the use of a bank account and payment cards. This total fee amounts on average EUR 35 a year (Capgemini/ING/EFMA, 2005). However, consumers do pay for their payment instrument use indirectly, and by means of - hidden - direct costs, like receiving no interest revenues on current account balances or value dating.

Dutch retailers recover their payments cost indirectly and sometimes directly from their customers. Indirectly by raising consumer prices and directly by charging consumers a "threshold" transaction fee. In principle, Dutch retailers are free to decide on: 1) a surcharge; 2) the payment instruments they want to surcharge; 3) the transaction amounts, and 4) the level of the charge. In practice, retailers who surcharge debit card payments surcharge payments below a certain threshold, e.g. below EUR 10 (see also section 5 for its incidence). The surcharge itself is fixed and does not depend on the transaction amount.

## **4 SURVEY DATA**

### **4.1 Consumer survey on debit card surcharging**

The consumer survey on surcharging debit card payments is part of the DNB Household survey (DHS). The survey was distributed to panel members aged 16 and older for completion during the weekend of 13 October 2006. Of the 2563 panel members qualifying for participation, 1,863 respondents answered the questionnaire in full. This questionnaire included questions related to the payment instrument choice of consumers, the impact of surcharging on it and their opinion about surcharging.

The DNB Household Survey (formerly known as the CentER Savings Survey) is a panel survey dating from 1993. The panel consists of some 2,000 Dutch households, of whom several members may participate. Data are collected using internet surveys. This may have introduced some positive selection bias towards electronic payment instruments in our results. However, we think the results will give a clear and quite accurate indication of the opinion of Dutch consumers on surcharging payments and the affects on their payment behaviour. We expect the pro-electronic bias in this study is rather small, for two reasons. First, new panel members do not need to have access to the Internet to enroll in the panel: the selection of new panel members is done by phone. This selection procedure enhances the representativeness of the panel. Second, the usage of internet is nowadays widespread among the Dutch, as more than 80% of them has access at home.

Generally, the sample represents the Dutch population fairly well, although there are slight differences. There are 1,863 respondents of whom 52% are male and 48% female. Most respondents use both cash and the debit card to make POS payments (80%). About 8% only uses cash. The average age of the respondents is 49 years which is somewhat higher than the (conditional) average age of the Dutch population (older than 15 years). Almost 80% of the respondents has a partner (married or living together), whereas this

holds for 60% of the Dutch population. The educational level of the respondents seems to be slightly higher than for the population as a whole.

#### 4.2 Retailer survey on debit card surcharging

The retailer survey on surcharging was held in September 2006 among 1000 Dutch retailers by a private company TNS Nipo, based on a questionnaire prepared by DNB. The survey included questions on payment instrument acceptance, payment behaviour of customers, surcharging, reasons to surcharge or not to surcharge, the impact of surcharging on payment behaviour, etc. Furthermore it had questions about firm characteristics. Interviewing was done by phone and respondents were mainly store managers. The sample was drawn from the registers of the Dutch Chamber of Commerce. It was stratified into eleven retail sectors and six company sizes (measured by numbers of employees) in order to ensure sufficient variation. Table 2 shows the unweighed number of retailers by branch and size in the sample. In the remainder of this study the presented figures are weighed in order to represent the Dutch population of retailers.

Table 2 Sample retailers by branch and firms size (unweighed data)

Branch	Freq	%	Firm size (No. employees)	Freq	%
Food	118	12	1	92	19
Garden centre, florist, etc	108	11	2-4	278	28
Clothing, shoes	90	9	5-9	210	21
Home improvement stores	100	10	10-19	160	16
Hotel/restaurants	104	10	20-49	108	11
Department stores, furniture	111	11	>=50	53	5
Media (books, DVDs, Cds)	69	7			
Drugstores, perfumery	85	8			
Other retail stores	109	11			
Gas stations/travel agencies	41	4			
Other services	66	7			
Total	1,001	100		1,001	100

## 5 RESULTS ON THE INCIDENCE OF SURCHARGING

### 5.1 Acceptance of payment instruments and surcharging debit card payments

Almost every retailer accepts payments in cash (see table 3). Acceptance is not 100% in branches where transaction amounts tend to be high, like in the hotel & catering industry or where cash is declined due to security risks (for instance at unmanned gas stations). Two-thirds of the retailers accept debit card payments and less than three out of ten accepts

credit cards. Card acceptance varies by industry. It is relatively common in industries where transaction amounts tend to be high. For instance, debit card acceptance is around 90% in clothes & shoe shops, drugstores & perfumeries, and florists & garden centres, whereas it is relatively low in the catering industry, specialised food stores and other service-providers. Card acceptance is determined not just by the segment of industry but also by company size: consumers can pay by debit card at only 40% of one-man businesses, whereas nearly all businesses with fifty or more employees accept debit cards.

With respect to surcharging debit card payments one out of five of the debit card accepting retailers surcharges customers for paying with debit card below a certain threshold amount. Three branches stand out: food, media and gas stations/travel agencies of which almost one out of two debit card accepting stores surcharge. At first sight the high surcharge rate for gas stations seems counterintuitive since the transaction amounts are usually high. However, many people pay separately for fuel, especially if they have a company or lease car, and small purchases (coffee, food, newspaper, etc). Again we see a strong company size effect: retailers with less than ten employees surcharge about ten times as often as the ones with fifty or more employees.

Table 3 Acceptance payment instruments and surcharging debit card payments (weighed data)  
(in percentages)

Branch	Cash	Debit card	Credit card	Surcharging <sup>a</sup>
Food	100	65	8	48
Garden centre, florists, etc	100	87	19	35
Clothing, shoes	100	88	54	19
Home improvement stores	100	76	16	29
Hotel & catering	98	41	27	15
Department stores, furniture	99	78	27	14
Media (books, DVDs, Cds)	100	82	32	47
Drugstores, perfumeries	100	87	16	29
Other stores & market	100	88	47	13
Gas stations/travel agencies	96	84	77	48
Other services	95	54	2	6
Company size				
1 employees	96	41	13	28
2-4	100	76	29	22
5-9	100	89	48	20
10-19	100	93	48	11
19-50	99	98	54	11
>50	100	92	67	2
Total	98	67	28	22

<sup>a</sup> percentages refer to the group of debit card accepting retailers

## 5.2 Some first explorations on the impact of surcharging on efficiency

Recent cost information suggests, as mentioned earlier, that the social break-even point has more than halved between 2002-2006. However, cash is still the dominant payment instrument for transaction amounts below EUR 20 (see table 1 in section 3). This suggests that from a costs perspective the debit card is underused. The question is whether surcharging has contributed to this under-usage.

The way in which retailers surcharge can give a first impression of the possibility of under- or overprovision of debit card services. Underprovision due to surcharging may stem from two sources. The first source is the induced incentive structure of the surcharge. If retailers surcharge the debit card above the socially optimal threshold then consumers, acting in accordance with this structure, may use cash more often than desirable from a cost efficiency point of view. The second source is the influence of surcharging on the choice behaviour of consumers. Irrespective of the level of the threshold, surcharging may give rise to the perception by consumers that debit cards are expensive relative to cash which is provided “for free” since ATM fees in the Netherlands are zero (see also Jonker, 2007). The average level of the surcharge may play a role here. The existence of a general feeling that cash is for free may influence consumers’ payment behaviour in all payment situations, including the ones where debit card payments are not surcharged. On the other hand, potential overprovision because cardholders do not face transaction fees for using debit cards may be mitigated when retailers surcharge debit card payments. However, this surcharge and threshold must be aligned with the social break-even point. Given the fact that the social break-even point has become very low makes overprovision of debit card services in the Netherlands quite unlikely.

### *Threshold level*

We start by taking a look at the threshold level retailers use for surcharging, in order to examine whether it may cause wrong signals to consumers (see figure 3). One out of five surcharging retailers employs a threshold of EUR 7.50 or lower, about three out of five uses a threshold level between EUR 8-12.50, and the remaining 20% utilises an even higher threshold. On average, the threshold amount is EUR 10. Only a small part of the retailers uses a threshold level which is adequate from a social cost perspective, whereas 80% applies one that is too high. These results indicate that it is quite likely that the threshold levels used by surcharging retailers leads to current underusage of the debit card.

It is rather striking that the current thresholds match very well the break-even point of 2002. When asked whether they have changed the threshold or the level of the surcharge 12% of the retailers state that they have changed the level of the fee, and only 1% has adjusted the threshold level. The latter suggests that changes in the break-even point are only partially translated into adjustments in threshold level. The present threshold would have been adequate from a social cost perspective for 2002 but nowadays it may contribute to an underusage of the debit card.

Figure 3 Share of surcharging retailers by threshold (weighed data)  
(in percentages, straight line denotes cumulative share)

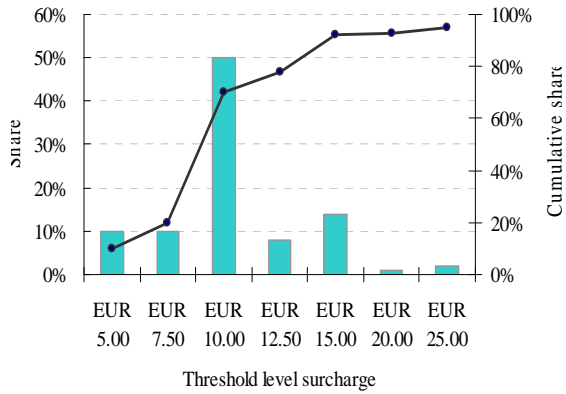
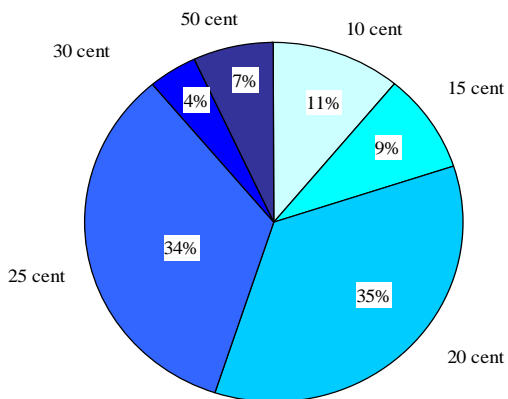


Figure 4 Share of retailers by level of surcharge (weighed data) (in eurocents)



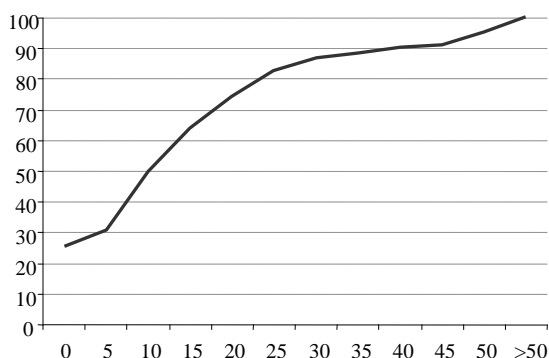
*Level of the debit card surcharge*

Figure 4 depicts the share of retailers by the level of the surcharge. The average level lies around 23 eurocents. It is relatively high compared to the surcharged transaction amounts. It implies a surcharge of 2.3% on a EUR 10 transaction amount. This may have contributed to the general thought among consumers that the debit card is an expensive payment instrument (see Jonker, 2007). Therefore, it is likely that surcharging has affected the payment behaviour of consumers, which is formally tested in the next section.

### Consumers' reaction

We asked the consumers about their payment choice and whether surcharging influences it. About 25% of the debit card payers indicated that the transaction amount does not affect their payment choice: if possible they will always use their debit card. The larger part however states that the surcharge does influence their payment choice (see figure 5). Most of them use cash for purchases below EUR 15. This range matches the thresholds used by surcharging retailers well, indicating that consumers might be steered toward the use of cash by the applied surcharge. If explicitly asked how they would pay if confronted with a surcharge of 10-15 euro cents for purchases below EUR 10, three-quarters of the respondents who use the debit card for paying purchases replied that they would be unwilling to pay for such a fee (see figure 6). Around two-thirds indicated that, faced with such a surcharge, they would pay cash, 4% would use their e-purse and 5% would shop elsewhere.<sup>13</sup> To put it differently, consumers react to fees and adapt their payment behaviour accordingly: they try to avoid the extra surcharge and do so by paying in cash.

Figure 5 Share of debit card payers using their card by transaction amount (in EUR) (in percentages)



An interesting point to note is that surcharging may cost retailers some customers. The retailer's survey confirms this finding: 6% of the retailers who lifted the debit card surcharge attracted more customers. This indicates that not levying a debit card surcharge may result in higher sales, which corroborates Rochet and Tirole's (2002) assumption that accepting debit cards is a service to consumers that gives a competitive edge and may increase business. Moreover, as Wright (2003) argues, initial underprovision of debit card services may be corrected when card services are not charged. Effectively, merchants cannot use their pricing power to inefficiently extract surplus from card users.

<sup>13</sup> If we exclude the consumers who stated that they usually use the debit card for transactions above EUR 10 (so irrespective of any surcharges) and focus on consumers who use their debit card for low transaction amounts then we still find a strong steering effect: more than 60% of them stated that they would not use their debit card.

Figure 6 Are you willing to pay a surcharge of 10-15 eurocent for using a debit card to pay an amount lower than EUR 10?

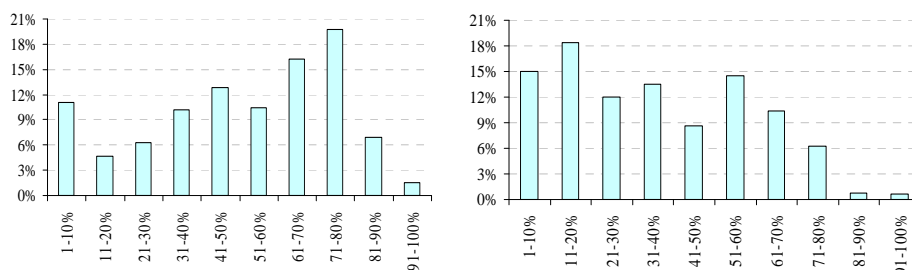


## 6 THE IMPACT OF SURCHARGING ON PAYMENT BEHAVIOUR

In this section the impact of surcharging debit card payments on the payment behaviour of consumers at the counter is examined, using information from the merchants. Retailers who accept debit card payments were asked to indicate the share of debit card payments on the total number of their incoming payments. Figure 7 depicts the results for retailers who do not surcharge (left-hand diagram) and for retailers who do (right-hand diagram). There are ten categories on the x-axis indicating the share of debit card payments in the total number of payments. The y-axis indicates the share of debit card accepting retailers in these categories. For example, the first bar on the left in the left-hand diagram indicates that 11% of the non-surcharging retailers has 10% or less debit card payments. The frequency distribution functions of the two groups of retailers are clearly different.<sup>14</sup> Stores with a debit card surcharge report fewer debit card payments than stores without. On average, one-third of the purchases in stores with a debit card surcharge is paid by debit card, as compared to around half of the purchases in stores without a surcharge.

Figure 7 Frequency distribution of the share of debit card payments in the total number of payments in shops without a debit card surcharge (left panel) and with a debit card surcharge (right panel)

<sup>14</sup> Various statistical tests reject the null hypothesis of equal distributions at the 5% level.



### 6.1 Estimating the impact of surcharging on payment behaviour

To assess the impact of surcharging on the demand for debit card services, as measured by the share of debit card payments in total (incoming) payments, we applied a linearly ordered probit model.<sup>15</sup> The dependent variable is the reported share of debit card payments in the total number of payments by the retailer (ten categories, see also Figure 7). We selected this type of probability model because of the discrete and linearly ordered nature of the dependent variable.<sup>16</sup> We added various controls to correct for specific firm characteristics and other exogenous influences in our model.<sup>17</sup>

We estimated three separate models. In the first model we used data from all debit card accepting retailers who indicated the share of debit card payments (n=812) and used a dummy variable indicating whether a retailer did or did not surcharge to measure the impact of surcharging, irrespective of the fee level or the threshold level. In the other two models we examined the impact of the fee level (model 2) and the threshold level of the surcharge (model 3) below which debit card transactions are surcharged. For estimating model 2 and 3 we only used data from surcharging retailers. Their number is rather low (n=174) and the estimated effects only provide us with some first insights in whether fee level and threshold level influence the payment choice of consumers. The estimated effects are shown in table A.1 in the appendix, together with tables A.2 and A.3 showing the marginal effects for the incidence of surcharging and changes in the fee level.

<sup>15</sup> See Greene (1993) for an introduction into the econometrics of ordered probit models.

<sup>16</sup> It is possible that some retailers decide to impose a debit card surcharge because they expect few debit card payments and want to recover some of their costs for accepting debit card payments. In these cases the expected share of debit card payments influences the choice to use a surcharge. If the expected share of debit card payments would play a role in the decision to surcharge or not for most retailers than a simultaneous equation model would have been more appropriate. However, we think it is more likely that retailers who expect few debit card payments and find the investment costs too high simply decide not to accept debit card payments at all. Therefore we decided to focus on the influence of surcharging on the payment behaviour of customers and not on the other possible relation.

<sup>17</sup> The control variables include branch dummies. In the estimation results presented in this paper all merchants have been included, irrespective of the branch they are active in. However, the inclusion of merchants who are active in branches where the transaction amounts and debit card usage tend to be high might have led to an overestimation of the impact of surcharging on payment choice. Estimation results in which merchants who are active in such branches were excluded from the analysis, revealed that the impact of surcharging did not differ significantly from the results presented in this paper, indicating that our results seem quite robust.

The results of model 1 show that retailers who surcharge can expect a significantly lower share of debit card payments in the total number of payments than retailers who do not surcharge. This effect still holds when we control for firm size (measured by number of employees or by sales), for industry type, for ownership type (shop is independent or part of a holding/chain) and the type of location as measured by degree of urbanization and province. The magnitude of the effect seems to be relatively large, indicating that surcharging does affect the payment choice of many customers. The format of the surcharge also seems to be important.<sup>18</sup> The estimated effect of the level of the fee is significant at the 10% level, (see model 2) indicating that the higher the charge the less likely consumers pay with a debit card. However, consumers' payment choice does not seem to be much affected by the cut off point below which debit card transactions are being surcharged. The threshold effect is not significant at the 10% level (see model 3). A possible explanation for this finding might be that the variation in the threshold amounts used is not large enough to yield significant results. Over 70% of the surcharging retailers uses a threshold between EUR 10-15. Another explanation might be that consumers remind which merchants surcharge debit card payments and which do not, but do not exactly recall which threshold amounts they use.

We also estimated marginal effects of surcharging on the share of debit card payments in the total number of payments. These estimated effects are significantly different from zero. They show that if a retailer surcharges debit card payments, the probability that its debit card share in the total number of payments lies between 1 and 40% increases whereas the probability that it is higher than 50% decreases compared with the debit card share of a non-surcharging retailer (see table A.2, 2<sup>nd</sup> column). Taking the marginal effects of all ten categories together, our analysis shows that applying a debit card surcharge decreases the share of debit card payments in total payments by 8%-points. It is about half of the difference between the average debit card share of surcharging and non-surcharging retailers shown in figure 7. At the level of the individual retailer the impact of surcharging is considerable. Our result states that if a retailer stops surcharging the share of debit card payments increases, on average, from 36% to 44%.

The impact of lowering the surcharge fee is shown in table A.3. If we increase the average fee of 23 cents by 9 eurocents (one standard deviation), the share in debit card payments declines with almost 3%-points. If we decrease the average fee by 23 cents, which more or less boils down to lifting the surcharge, the debit card share increases with almost 7 %-points. This figure is broadly in line with the previously found 8%-points for not levying the fee. In subsection 6.4 we will illustrate the economic impact of removing the debit card surcharge on the entire retail payment system.

## 6.2 Other firm characteristics affecting the share of debit card payments

Apart from surcharging by merchants there are additional firm characteristics as well that influence the demand for debit card services of consumers. A closer look at the estimation results regarding type of industry suggests that the transaction amount influences payment behaviour of consumers. They pay significantly more often in cash when the transaction amount is relatively low (specialized food store, catering, florist, etc.) and use their debit

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<sup>18</sup> By format of the surcharge we refer the combination of the threshold level employed by the retailer and the level of the surcharge.

card significantly more often when the transaction amounts are relatively high (clothing or shoe store, gas station). These findings were found by only using data from debit card accepting stores while controlling for surcharging. They support the view that the transaction amount is an important factor explaining industry differentials in debit card usage.

Firm size as measured by sales revenues has a positive significant effect on debit card share. Another measure of firm size, the number of employees, does not have a significant effect on payment behaviour. However, if we run the same regression without the sales dummies the number of employees becomes statistically significant. The firm size effect seems intuitively plausible. Dutch consumers are used to pay in cash in small stores since those shops traditionally often only accept cash (see also section 5.1).

The Netherlands is divided into twelve provinces. Eight out of eleven province-dummies are statistically significant. Compared to retailers in Noord-Holland (the reference province in which the capital city Amsterdam is located) retailers in other provinces, except for Zeeland and Limburg, have a larger debit card share. Part of the explanation may lie in differences in age distribution (see also table A.4) between different provinces. For instance, Flevoland is a province with a relatively young population.

### 6.3 Who is sensitive for debit card surcharges?

The previous analyses show that many but not all consumers are sensitive to surcharges. We already touched upon the influence of age. In this section we will try to shed some light on the question which consumers react to debit card surcharges and which ones are less price sensitive. In the consumer survey we asked respondents to indicate what they would do if they had to pay a surcharge for a debit card payment below EUR 10 (see also figure 6). We now focus on two most often mentioned answer possibilities, namely *“I’ll use cash instead”* and *“I’ll use my debit card”*, with the former possibility reflecting that a cardholder is sensitive for the pricing of card services and the latter that a card holder’s demand for card services does not depend on price. We estimated two probit regressions, one for each of the above mentioned responses to debit card surcharges. We excluded respondents who never used the debit card for making payments. As explanatory variables we included standard demographic characteristics like age, gender, marital status, educational and income levels. We also included explanatory variables indicating the degree of urbanization of the respondent’s residence and province in order to account for regional differences. The results are shown in table A4.

Age is an important factor. People below 35 years of age indicated significantly more often to use the debit card than people aged 65 or higher (reference group). This holds to a lesser extent for people between 35 and 44 years of age. The age effects explaining the choice for cash are contrary to the ones we found for the debit card. These findings suggest that age is positively related to price sensitivity for card payment services.

Gender also affects the way people react to surcharges. Men are significantly less likely than women to use cash instead of the debit card when confronted with a surcharge. However, they did not indicate significantly more often than women to use the debit card, surcharge or not. This suggests that they are not so much less sensitive to pricing than women, but that they use other ways to evade the surcharge. The data reveal that men tend to use the e-purse more often than women and that they simply go to another shop.

Income and educational levels are important factors as well. When faced with a surcharge, we observe that low and high income respondents shy away from using their debit cards, and use cash instead (reference group middle income and intermediate educational level). With respect to the educational level we find a negative relationship between education and the willingness to pay the debit card surcharge. Taken together, the results from income and education reveal that highly educated, well-earning respondents are among the most price sensitive payers. This result is somewhat striking since, from a budget perspective, one would expect that the less rich would be more sensitive to price signals. Once controlled for personal characteristics there is hardly any evidence of regional differences in price sensitivity. Urbanization degree does not seem to matter a lot either.

#### **6.4 Indication of cost savings by removing the debit card surcharge**

Savings in POS payments can be achieved if consumers substitute (“expensive”) cash payments for (“cheap”) debit card payments. Retailers could steer consumers towards debit cards if they would stop charging debit card payments. To gauge just how much banks, retailers, the central bank (DNB) and the card processing centre (Equens) together could save in the Netherlands, three ad hoc scenarios were briefly examined (see table 4). The cost data used in this scenario analysis are from several different sources, namely EIM (2007) for the costs of retailers and the catering industry, McKinsey & Company (2006) for the costs made in the banking community and Brits and Winder (2005) for the costs borne by DNB. Following the approach by Brits and Winder (see also section 3.3) we focused on variable costs in our projections for cost savings. We distinguished between costs that vary with the number of transactions and the costs that vary with the value of the transactions.<sup>19</sup>

The direct consequences of the surcharges will presumably show up first in stores which used to surcharge debit card payments of small transaction amounts (scenario 1). In this scenario, these stores’ share of debit card payments will expand by 8%-points if the surcharge is dropped. Assuming substitution for payments in the EUR 10-15 expenditure category, this “immediate” scenario suggests that the total number of debit card payments could increase by 67 million annually, and its total value by EUR 840 million. It is likely that after some “reaction” time, this effect will feed through to all POS locations which accept debit cards, and for more purchase amounts. As the debit card surcharge disappears, the perception that debit cards are meant especially for larger transaction amounts will gradually disappear. Survey evidence has shown that consumers tend to consider debit card payments more convenient than cash, but dislike the pricing aspects of debit cards, such as the surcharge on small transaction amounts (Jonker, 2007). Therefore, with the surcharge

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<sup>19</sup> By following the approach in Brits and Winder (2005) when we updated the 2002 cost figures we could provide assessments of costs savings for businesses in the payment chain. Cost savings of consumers and changes in non-monetary benefits were not included. Incorporating them was beyond the scope of this study. However, some ‘back of the envelope’ calculations, taking into account the findings in Jonker (2007) showing that consumers appreciate the debit card higher than cash with respect to safety, convenience and transaction speed, indicate that the total costs and benefits of less or no surcharging would have been higher when consumers would also have been included in the analysis.

being removed, consumers may consequently adjust their payment habits and start using their debit cards for both small and large transaction amounts.

Scenarios 2 and 3 indicate the consequences of the change in payment behaviour in the long term. Scenario 2 shows what happens if the share of debit card payments for purchases of EUR 10-60 in the total number of payments increases by 10%-points. Although the amount continues to co-determine the choice of instrument, the preference shifts to the debit card. In scenario 3, it is assumed that the purchase amount no longer matters for the choice of payment instrument. Purchases of EUR 10-60 are then paid just as often by debit card as by cash, as are purchases in excess of EUR 60. In this scenario, the share of debit cards is assumed to rise to 75 percent. As a result, 1.2 billion cash payments are replaced by debit card payments, and the total amount involved in debit card payments expands by EUR 16 billion.

The direct costs saved by lifting the debit card charges in scenario 1 amount to EUR 5 million. This is a modest sum given the total costs of over-the-counter payments. These small cost savings arise because initially only few cash payments will be replaced, corresponding to transaction amounts for which the cost of a cash payment barely differs from that of a debit card payment. If consumers were to use their debit cards more often for all purchases of EUR 10-60, savings of around EUR 50 million (scenario 2) to EUR 110 million (scenario 3) might be achieved. This is around 4-8% of the variable costs of cash and debit card payments combined. The bulk of savings is accounted for by retailers and the catering industry.

Table 4 Indication of payment cost savings

Scenario	Influence on debit card payments		Savings	
	Numbers in millions	Value in EUR billion	Value in EUR million	in EUR million
1: direct effect of abolition debit card surcharge	67	0.8	5	
2: 10%-points increase in debit card payments for EUR 10-60 purchases	340	6.7	50	
3: share of debit card payments for EUR 10-60 rises to 75%	1180	16.0	110	

## 7 CONCLUSIONS

In the Netherlands retailers are allowed to surcharge consumers for the usage of payment instruments. One in five debit card accepting retailers makes use of this possibility and charges customers for small debit card payments. In such cases, most consumers opt for

cash. Retailers that charge a fee on debit card payments below a certain transaction amount are thus influencing the way their customers pay for purchases. Moreover, applying a surcharge to card payments can to some extent neutralise the effects of interchange fees on payment behaviour of consumers and acceptance decisions by retailers.

The design of the surcharge which Dutch retailers use initially enhanced the efficiency of the POS payment system. In 2002 the most efficient way to pay an amount below EUR 11.63 was by paying in cash. Many retailers geared their surcharge such that debit card payments below EUR 10-15 were charged an extra fee, in line with cost efficiency. However, due to technological developments and increasing payment volumes the amount below which cash is more cost efficient than the debit card has decreased considerably in a few years time, whereas the threshold level of surcharging retailers has hardly changed. As a consequence, applying a surcharge would now lead to an underusage of the debit card and removing debit card charges by retailers will thus increase cost efficiency. This result shows that both the way in which retailers surcharge, as well as developments in costs and payment instrument usage should be taken into account when assessing whether surcharging supports the efficient usage of payment cards.

Removing debit card charges will lead to more debit card payments and reduce the use of cash. Estimation results show that the share of debit card payments in the total number of payments in a store will on average increase by 8%-points if the retailer decides not to surcharge anymore. The consequences of lifting debit card surcharges altogether for the costs of businesses of POS payments are modest in the short term. Only a limited number of cash payments will directly be substituted and the cost savings per transaction will be small. It is likely that the total effect of removing the debit card surcharge attains its full impact after some time, when consumers stop perceiving the debit card as being expensive-as many Dutch currently still do. Scenario analyses indicate that savings up to EUR 110 million may be possible, which represents about 8% of the variable costs of cash and debit card payments. Although less surcharging debit card payments in the Netherlands will be favourable for the cost efficiency of the Dutch POS system, in general prohibiting the ability to surcharge may also have adverse effects on cost efficiency. It may lower the market power of retailers vis-à-vis payment services providers, leading to higher merchant fees for card payments and possibly, lower card acceptance by retailers. This efficiency trade-off begs for more empirical payment research.

The Dutch results are relevant for Europe. The “no surcharge” rule that some card schemes impose on retailers is currently under pressure by competition authorities. If they do not allow the usage of the no-surcharge rule by card schemes then retailers’ market power will increase. Retailers may start charging their customers additional fees for paying with expensive payment instruments and steer them towards instruments that are relatively less costly for them. It is therefore important that merchant fees for payment transactions (cash and card payments) reflect the true costs. Cost savings by other players in the payment chain should be passed onto consumers and merchants to ensure that.

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## REFERENCES

**Armstrong, M.** (2006), Competition in two-sided markets, *RAND Journal of Economics* 37, 668-691.

**Baxter, W.P.** (1983), "Bank Interchange of Transactional Paper: Legal Perspectives" *Journal of Law and Economics* 26, 541-588.

**Boeschoten, W.C. and M.M.G. Fase** (1989), The Way we Pay with Money, *Journal of Business and Economic Statistics* 7(3), 319-326.

**Boeschoten, W.C.** (1992), Currency use and Payment Patterns, PhD-thesis, Universiteit van Amsterdam.

**Bolt, W.** (2006), Retail payments in the Netherlands: Facts and theory, *De Economist* 154(3), 345-372.

**Bolt, W. and Chakravorti** (2008), Consumer Choice and Merchant Acceptance of Payment Media, mimeo.

**Bolt, W., D. Humphrey and R. A. Uittenbogaard** (2008), The Effect of Transaction Pricing on the Adoption of Electronic Payments: A Cross-Country Comparison, *International Journal of Central Banking* 4, 89-123.

**Bolt, W. and A.F. Tieman** (2008), Heavily skewed pricing in two-sided markets, *International Journal of Industrial Organization* 26, 1250-1255.

**Borzekowski, R and E.K. Kiser** (2006), The Choice at the Checkout: Quantifying Demand Across Payment Instruments, *International Journal of Industrial Organization* 26, 889-902.

**Borzekowski, R., E. K. Kiser and S. Ahmed** (2007), Consumers' Use of Debit Cards: Patterns, Preferences, and Price Response, *Journal of Money, Credit and Banking* (forthcoming)

**Bounie, D. and A. François** (2006), Cash, Check or Bank Card? The Effects of Transaction Characteristics on the Use of Payment Instruments, *Telecom Paris Economics and Social Sciences Working Paper No. ESS-06-05*

**Brits, J.H. and C.C.A. Winder** (2005), Payments are no free lunch, *DNB Occasional Studies* 3(2), De Nederlandsche Bank NV, Amsterdam.

**Capgemini/ING/EFMA** (2005), *World Retail Banking Report 2005*.

**EIM** (2007), Het toonbankbetalingsverkeer in Nederland. Kosten en opbrengsten van toonbankinstellingen in kaart gebracht (Point-of-Sale Payments in the Netherlands: Costs and Revenues of Merchants), final report, Zoetermeer.

**Fusaro, M.** (2006), Debit vs. credit: a rational model of self-control with evidence from checking accounts, mimeo, East Carolina University.

**Gans, J. S. and S. P. King** (2003), The neutrality of interchange fees in payment systems, Topics in Economic Analysis and Policy, 3(1), article 1.

**Garcia-Swartz, Daniel D., Robert W. Hahn and Anne Layne-Farrar** (2006a), The Move Toward a Cashless Society: A Closer Look at Payment Instrument Economics, Review of Network Economics 5(2), 175-198.

**Garcia-Swartz, Daniel D., Robert W. Hahn and Anne Layne-Farrar** (2006b), The Move Toward a Cashless Society: Calculating the Costs and the Benefits, Review of Network Economics 5(2), 199-228.

**GfK/Currence** (2007) Monitor Consumptieve Toonbankbetalingen in Nederland (Monitor Point-of-Sale Payments in the Netherlands), Annual Report 2006.

**Greene, W.H.** (1993), Econometric Analysis, 2nd edition, MacMillan Publishing Company, New York.

**Hayashi, F. and E. Klee** (2003), Technology Adoption and Consumer Payments: Evidence from Survey Data, Review of Network Economics 2, 175-190.

**Humphrey, D.B., L.B. Pulley and J.M. Vesala** (2000), The check's in the mail: why the United States lags in the adoption of cost-saving electronic payments, Journal of Financial Services Research 17, 17-39.

**Humphrey, D.B.** (2004), Replacement of cash by cards in U.S. consumer payments, Journal of Economics and Business 56, 211-225.

**Hyytinen, A. and T. Takalo** (2004), Multihoming in the Market for Payment Media: Evidence from Young Finnish Consumers, Discussion paper 25/2004, Bank of Finland.

**IMA Market Development** (2000), Study regarding the Effects of the Abolition of the Non-discrimination Rule in Sweden for European Commission Competition Directorate General, IMA Market Development AB, 29.2.2000.

**Jonker, N.** (2007), Payment Instruments as Perceived by Consumers – Results from a Household Survey, De Economist 155(3), 271-303.

**Jonker, N. and T. Kettenis** (2007), Explaining cash usage in the Netherlands: the effect of electronic payment instruments, DNB Working paper no. 136.

**Kahn, C.M. and W. Roberds** (2007), Why Pay? An Introduction to Payment Economics, mimeo.

**Kennickell, A.B. and M. Kwast** (1997), Who uses electronic banking? Finance and Economics Discussion paper, Board of Governors of the Federal Reserve System

**Klee, E.** (2004), How people pay? Evidence from grocery store data, mimeo, Board of Governors of the Federal Reserve System

**Klee, E.** (2006a), Families' use of payment instruments during a decade of change in the U.S. payment system, Finance and Economics Discussion Paper, Board of Governors of the Federal Reserve System

**Klee, E.** (2006b), Paper or plastic? The effect of time on check and debit card use at grocery stores, Finance and Economics Discussion Paper, Board of Governors of the Federal Reserve System

**Loix, E, R. Pepermans** and L. van Hove (2005), De Belgische Consumenten over Elektronisch Betalen: Resultaten van een Opinieonderzoek (The Belgian Consumer and Electronic Payments: Results from a Cardholder Survey), Bank en Financieuzen 69, 16-28.

**McKinsey&Company** (2006), Betalingsverkeer in Nederland: een onderzoek naar de opbrengsten en kosten voor het bankwezen (Payment Systems in the Netherlands: a Study into Revenues and Costs for the Banking Sector), final report.

**Mester, L.J.** (2006), Changes in the use of electronic means of payment: 1995-2004, Federal Reserve Bank Philadelphia Business Review 0(2), 26-30.

**NMa** (2005), Monitor Financiële Sector 2005 (Monitor Financial Sector 2005), Den Haag,

**Rochet, J-C. and J. Tirole** (2002), Some economics of payment card associations, Rand Journal of Economics 33, 549-570.

**Rochet, J-C. and J. Tirole** (2003), Platform competition in two-sided markets, Journal of the European Economic Association 1, 990-1029.

**Rochet, J-C and J. Tirole**, 2006, Two-sided markets: A progress report, RAND Journal of Economics 37, 645-667.

**Rysman, M.**, (2006), An Empirical Analysis of Payment Card Usage, Journal of Industrial Economics 55, 1-36.

**Stavins, J.** (2001), Effect of Consumer Characteristics on the Use of Payment Instruments, New England Economic Review 3, 21-31.

Preliminary Draft  
De Nederlandsche Bank

**Wright, J.** (2003), Optimal card payment systems, *European Economic Review* 47, 587-612.

**Zinman, J.** (2006), Debit or Credit? *Journal of Banking and Finance* (forthcoming).

## APPENDIX:

Tabel A.1 Ordered probit results on the impact of surcharging on the share of debit card payments

	Model 1		Model 2		Model 3	
	Coef.	Z	Coef.	z	Coef.	z
Usage of surcharging=1	-0.41**	4.28	-	-	-	-
fee level	-	-	-0.02*	1.70	-	-
cut off point	-	-	-	-	-0.01	0.30
City	0.04	0.27	0.01	0.04	0.06	0.16
Town	-0.04	0.31	-0.44	1.31	-0.38	1.13
Village/countryside	-0.16	1.07	-0.33	0.92	-0.25	0.72
Provinces						
Zuid-Holland	0.27**	2.11	-0.14	0.45	-0.15	0.48
Utrecht	0.54**	3.02	1.52**	3.35	1.53**	3.29
Flevoland	0.72*	1.77	1.34**	1.98	1.36**	1.99
Overijssel	0.68**	3.65	0.94**	2.27	0.94**	2.26
Drenthe	0.44*	1.89	-0.32	0.57	-0.38	0.68
Gelderland	0.27*	1.94	0.14	0.43	0.14	0.44
Friesland	0.30	1.46	0.72*	1.72	0.75*	1.81
Groningen	0.58**	2.78	0.95*	1.71	0.89	1.61
Noord Brabant	0.39**	2.91	0.47	1.50	0.41	1.32
Zeeland	-0.16	0.62	-0.075*	0.09	-0.04	-0.08
Limburg	0.04	0.21	0.67	1.60	0.64	1.51
Independent store	-0.03	0.33	-0.49*	1.70	-0.57**	1.99
Firm size 5-19 employees	-0.02	0.18	0.16	0.81	0.14	0.72
20-49 employees	0.06	0.41	0.20	0.41	0.18	0.36
Over 49 employees	-0.21	1.15	-1.02	1.29	-0.96	1.21
sales < EUR 25K	-0.64**	2.35	1.55	1.28	1.09	0.92
EUR 25K <sales< EUR 49K	-0.46*	1.67	-0.42	0.78	-0.38	0.71
EUR 49k <sales< EUR 100K	-0.47**	2.23	-0.01	0.01	0.00	0.01
EUR 100K <sales< EUR 200K	-0.47**	2.77	-0.19	0.51	-0.20	0.53
EUR 200K <sales< EUR 500K	-0.20	1.53	-0.15	0.45	-0.23	0.68
Sales unknown	-0.05	0.57	0.15	0.74	0.13	0.63
Branch						
Food	-0.80**	5.09	-1.14**	2.69	-1.12**	2.65
Greenery, florist	-0.54**	3.52	-0.57	1.31	-0.55	1.26
Clothing, shoes	0.63**	3.95	1.19**	2.38	1.20**	2.37
Home improvement stores	-0.07	0.44	0.60	1.26	0.59	1.25
Catering, hotels	-1.24**	6.86	-0.87	1.56	-0.96*	1.71
Media (Books, Cds, Dvds)	-0.42**	2.38	-0.17	0.41	-0.20	0.48
Drugstores/Perfumery	-0.99**	6.08	-0.52	1.12	-0.43	0.93
Other stores	0.42**	2.79	0.85*	1.66	0.78	1.53
Gas stations, travel agencies, etc	0.37*	1.73	1.08**	2.33	1.02**	2.22
Other services	0.39**	2.00	-0.94	1.27	-0.96	1.29
cut1	-1.89		-2.52		-2.26	
cut2	-1.52		-1.86		-1.60	
cut3	-1.09		-1.29		-1.04	

Table A. 1 continued

	Model 1	Model 2	Model 3
	Coef.	Coef.	Coef.
cut4	-0.60	-0.61	-0.36
cut5	-0.15	-0.07	0.16
cut6	0.26	0.60	0.82
cut7	0.84	1.18	1.40
cut8	1.74	1.87	2.09
cut9	2.66	2.48	2.72
log likelihood	1,606.74	-304.93	-306.33
pseudo R-squared	0.09	0.14	0.14
no of obs.	812	169	169

\*\* denotes significance at 5%, \* denotes significance at 10% level

Table A.2 Marginal effects model 1 Incidence of surcharging on share of debit card payments at store level

Share	Pr(share=j  no surcharge)	Marginal dPr(Share=j)/d(surcharge= yes)	effect P+dP= Pr(Share=j  surcharge=yes)
1-10%	0.052	0.054**	0.109
11-20%	0.052	0.033**	0.085
21-30%	0.100	0.042**	0.141
31-40%	0.164	0.032**	0.196
41-50%	0.178	-0.001	0.177
51-60%	0.153	-0.026**	0.127
61-70%	0.167	-0.056**	0.111
71-80%	0.111	-0.060**	0.051
81-90%	0.021	-0.016**	0.005
91-100%	0.002	-0.002*	0.000

\*\* denotes significance at 5%, \* denotes significance at 10% level

Table A.3 Marginal effects model 2 Impact level of surcharge on share of debit card payments at store level

Share	Pr(Share=j)	Marginal dPr(Share=j)/d Tariff up by 1 cent)	effect Effect for a 9 cent increase In fee level	P+dP(9 cents)
1-10%	0.042	0.002*	0.015	0.057
11-20%	0.101	0.003*	0.023	0.124
21-30%	0.165	0.002*	0.021	0.187
31-40%	0.264	0.001	0.007	0.271
41-50%	0.192	-0.001*	-0.014	0.178
51-60%	0.154	-0.003*	-0.016	0.134
61-70%	0.058	-0.002*	-0.016	0.042
71-100%	0.023	-0.001	-0.009	0.014

\* denotes significance at 10% level

Table A.4 Impact of surcharging debit card payments with 10-15 eurocents when the transaction amount is below EUR 10

	Debit card payment		Cash payment	
	Coef.	z	Coef.	z
Male=yes	0.064	0.83	-0.168**	-2.43
Married=yes	-0.008	-0.07	-0.007	-0.08
Children	0.063	0.67	-0.037	-0.44
Wealth	0.000	-0.32	0.000	0.39
Age 15-24	0.516*	1.80	-0.606**	-2.30
25-34	0.478**	2.88	-0.501**	-3.36
35-44	0.163	0.98	-0.225	-1.53
45-54	0.081	0.52	-0.161	-1.18
55-64	0.076	0.55	-0.160	-1.34
Town	0.339**	2.41	-0.170	-1.34
City	0.033	0.29	-0.071	-0.71
Village	0.092	0.81	0.007	0.07
Countryside	0.026	0.21	0.142	1.29
Employed	0.153	1.48	-0.031	-0.34
Studying	0.034	0.13	-0.055	-0.22
Income very low	-0.020	-0.13	0.011	0.08
low	-0.223**	-2.18	0.198**	2.11
high	-0.323**	-3.51	0.202**	2.44
Primary school	0.225	1.30	-0.085	-0.52
Secondary school	0.165*	1.72	-0.155*	-1.77
Higher vocational education	0.000	0.00	-0.065	-0.73
University	-0.276*	-2.01	0.072	0.62
Provinces				
Groningen	-0.040	-0.20	-0.110	-0.62
Friesland	0.295*	1.68	-0.233	-1.43
Drenthe	0.271	1.31	-0.404**	-2.12
Overijssel	0.205	1.26	-0.154	-1.04
Flevoland	0.184	0.66	-0.170	-0.67
Gelderland	0.119	0.84	-0.198	-1.57
Utrecht	-0.120	-0.65	0.004	0.02
Noord Holland	-0.011	-0.09	-0.042	-0.38
Zeeland	-0.120	-0.48	-0.006	-0.03
Noord Brabant	0.066	0.49	-0.045	-0.38
Limburg	0.024	0.14	0.007	0.05
Constant	-1.176**	-5.98	0.842**	4.82
log likelihood	-790.4		-1018.5	
pseudo R-squared	0.05		0.03	
no of obs.	1668		1668	

\*\* denotes significance at 5%, \* denotes significance at 10% level