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Thomas Wiechert
University of St. Gallen, thomas.wiechert@unisg.ch

Frederic Thiesse
University of St. Gallen, frederic.thiesse@unisg.ch

Elgar Fleisch
University of St. Gallen & ETH Zurich, elgar.fleisch@unisg.ch

A QUANTITATIVE EVALUATION OF NFC BASED CONTACTLESS PAYMENT SYSTEMS IN RETAIL

Wiechert, Thomas J. P., ITEM-HSG, University of St. Gallen, Dufourstrasse 40a, 9000 St. Gallen, Switzerland, thomas.wiechert@unisg.ch

Thiesse, Frédéric, ITEM-HSG, University of St. Gallen, Dufourstrasse 40a, 9000 St. Gallen, Switzerland, frederic.thiesse@unisg.ch

Fleisch, Elgar, ITEM-HSG, University of St. Gallen and D-MTEC, ETH Zurich, Dufourstrasse 40a, 9000 St. Gallen, Switzerland, elgar.fleisch@unisg.ch

Abstract

Near Field Communication (NFC) technology allows for the implementation of novel contactless payment systems in stationary retail. In this paper, we quantitatively analyze the impact of such systems on a retailer's payment costs on the example of real-world data from a Swiss food retailer. Our results indicate that the introduction of contactless payment under current card fee models would in virtually any case significantly increase the payment costs due to the substitution of low cost cash payments for expensive card payments. This increase might be balanced out by a substantial growth in sales, a reduction in operating costs, or a reduction of card transaction fees.

1   INTRODUCTION

The term "Near Field Communication" (NFC) denotes a wireless communication technology that operates at 13.56 MHz and is compatible to the international industry standards ISO/IEC 14443 and ISO/IEC 18092. The integration of a NFC module into mobile phones or PDAs enables these devices to act as contactless smartcard as well as to read from and write onto such cards. Possible applications include the use of NFC devices for mobile payments, as electronic tickets, for the participation in loyalty programs, and for the storage of rebate coupons. The fact that NFC compatible devices can hold a large number of virtual smart cards in the form of secured applications allows for providing their owners with access to a wide variety of contactless services without the need to carry numerous plastic cards. In recent years, most manufacturers of mobile phones have developed corresponding prototypes. The Nokia 6131 NFC phone has, to date, been the only NFC-compatible device freely available on the market, while all others were available to technology trial organizers only.

In recent years, numerous trials of NFC-based payment have been conducted world-wide. The first publicized example was started in August 2005 in the Dutch town of Kerkrade (KPN 2005). In November 2006, the first trial to implement an EMV-compliant payment process and to use the SIM as secure element for the storage of the NFC application was conducted in the French Strasbourg. This brought the contactless payment process closer to the conventional payment process called "Chip and PIN" as it is practiced in Europe (NFC Forum 2006). In November 2007, the French cities of Caen and Strasbourg saw the launch of the first trial to include all mobile network operators and all banks of an entire country (Balaban 2007).

Against this background, our contribution specifically considers the use of NFC as a novel technology for the realization of payment systems in stationary retail. Retailers are currently confronted with several challenges in regard to their relationship with their customers. According to Chu and Morrison (2002), 75% of retailers view waiting lines at the checkout as the most important factor for improving the customers' shopping experience. Measurements by large payment system providers seem to indicate that NFC might be able to significantly speed up the payment related part of the check-out process. The payment system providers claim to have measured contactless payments as being 20% to 63% faster than cash transactions and 20% to 53% faster than magnetic stripe based card transactions (cf. Table 1). Additionally, Visa states that the implementation of their contactless solution has lead to a waiting line reduction of up to 23% (Visa 2008).

	Average Transaction Times (in seconds)			Acceleration through Contactless Technology	
Measured by	Cash	Magnetic Stripe	Contactless	Cash	Magnetic Stripe
American Express	33.7	26.7	12.5	63%	53%
MasterCard	n/a	n/a	n/a	20%	20%
Visa	34.0	24.0	15.0	56%	38%

Table 1: Transaction times for the payment by cash, magnetic stripe cards and contactless cards Based on data from: Said (2006), Bradford (2005), MasterCard (2008)

According to Visa and MasterCard their contactless solutions also leads to a growth in sales for adopting retailers. This would come about by means of an increased number of transactions and larger average expenditure by those customers that pay contactless. MasterCard states that PayPass users visit stores accepting contactless payment cards 33% to 52% more often than other customers, and that they spend 28% to 42% more per purchase than they did previously (MasterCard 2008). Visa, on the other hand, claims that customers using their contactless payment solution PayWave spend 22% more than those using cash (Visa 2008). Both companies attribute this increase in spending to the elevated transaction convenience and the fact that the shoppers' expenditure is not curtailed by the amount of cash they carry.

It is understood that the before mentioned figures should be interpreted with care since the detailed data underlying these published transaction times has not been made available for scrutiny. Furthermore, the studies by payment service providers ignore the financial impact that the implementation of a new payment technology would have, due to the occurring transfer of payment transactions between payment methods. Since each of these methods (e.g. cash, debit cards and credit cards) is subject to its own individual cost and fee structure these transfers would mean a change in the payment costs that retailers have to bear. The most significant transfer would probably occur from low cost cash payments to more expensive card payments, which would lead to an increase in payment costs for retailers. This increase in costs might however be recouped in part or neutralized entirely by the growth in sales promised by the payment system operators. Other means of preventing a cost increase for the retailers are a general reduction in card fees or a special rate for small payments.

Our research concerns itself with the following question: how would the implementation of NFC-based contactless payment affect the payment costs of stationary retailers? For this purpose, we assess the financial impact of novel payment technologies with the help of a mathematical model. We subsequently illustrate its practical use on the example of a data set of payment transactions provided by a Swiss operator of small supermarkets and convenience stores. Moreover, we analyze the influence of a growth in sales on payment costs as well as the impact of reduced transaction fees.

2 RELATED WORK

In their recently published review of literature focusing on mobile payment, Dahlberg et al. (2008) classify 73 relevant publications, in accordance to the stakeholders and issues that they focus on. While 29 publications focus on the technological aspects of mobile payments and 20 on the consumer, only five papers focus on mobile payment providers (Kreyer, et al. 2003, Vilmos and Karnouskos 2003, Karnouskos 2004, Vilmos and Karnouskos 2004, Zmijewska and Lawrence 2005) and four center on retailer-related issues (van der Heijden 2002, Ondrus and Pigneur 2004, Mallat and Tuunainen 2005, Teo, et al. 2005). The literature review's authors state that the number and diversity of mobile payment publications focusing on retailers are disappointing, and further claim that quantitative studies are needed in order to contribute to a better understanding of merchant adoption. This paper contributes to filling this gap by analyzing the financial impact that the implementation of NFC-based mobile payment will have on retailers and by indicating to mobile payment providers how mobile payments will have to be priced so as to make this technology a viable alternative for retailers.

Not all of the work on mobile payment is however related to this paper without qualification. The term "mobile payment" not only describes payment by means of a mobile device at a point of sale in a retail store, which is the focus of our work. It also includes three other usage scenarios: the use of mobile devices for the payment of mobile content (e.g. mobile phone ringtones), the settlement of purchases made in online stores and its use for consumer to consumer payments (Kreyer, et al. 2003). As this paper is focused on payments in stationary retail, the publications that focus on the other mobile payment scenarios loose some of their relevance.

Mallat (2004) provides a review of literature dealing with information technology adoption and acceptance and discusses the usability of the applied theories in explaining the adoption of mobile payment. While Dewan and Chen (2005) isolate factors which will influence the adoption of mobile payments, Mallat (2007) discusses the inherent advantages of mobile device based payments in comparison with other payment technologies, and how these will advance mobile payment adoption. Amin (2007) studied the attitude of Malaysian bank customers towards mobile credit cards, while Kristoffersen et al. (2008) researched the consumer perception of mobile-based micropayments. Klee (2006) analyzed the time-saving of switching from one payment method to another based on large quantities of POS data. Her results show that debit card payments take on average 30% less time than check payments. A comparable study for contactless and mobile payments is not available.

Several publications have discussed aspects of the costs of payment. Worthington (1996) compared the costs incurred through payment by various methods and emphasized the importance of costs in the adoption of new payment methods. Ardizzi (2004) discussed cost structures and efficiency of payment systems on the basis of the Italian credit card system. Bean (2006) analyzed past developments of card payment fees and made suggestions on how to lower them. Huchzermeier and Van der Heyden (2007) concluded that payment costs are too high due to the inefficiency of the payment card market. They suggest that more retailers should become payment scheme operators, thereby becoming competitors to the established payment systems. Guibourg and Segendorff (2007) made an estimate of the Swedish bank sector's payment costs and concluded that there are large cross subsidies between the profitable card payments and the unprofitable cash payments. Finally, Papaefstathiou and Manifavas (2004) evaluated the transaction costs for micropayment systems and underlined the importance of transaction costs for the success of electronic micropayment systems. There were, however, no publications on the financial impact that the implementation of a payment instrument or transfer between payment methods would have on a retailer.

We are not aware of any publications that describe the financial impact of payment method and payment technology adoptions on retailers. This seems to constitute a neglected field of research. The publications closest to the methodology of this thesis are a series of articles which analyzed the financial impact that discounts for shoppers who pay cash, instead of using a credit card, would have on retailers (Gordon, et al. 1977, Ingene and Levy 1982, Grant, et al. 1985). The fact that confounded the matter was that retailers would have to give discounts to all cash-paying customers, regardless of whether they had originally intended to pay with credit cards or not. Comparable publications dealing with the financial impact of new payment methods or payment technologies do not exist.

3   METHODOLOGY

We developed a mathematical model in order to measure the financial impact that the decision to adopt a new payment technology would have on a stationary retailer, which we shortly describe in this section. The main input parameters of the model are the concerned retailer's revenue structures, its current payment method specific costs and fees, and the anticipated transfers of transactions and revenue between payment methods caused by the implementation of the new technology.

Revenue structures. This paper refers to the allocation of payment transactions and revenue to the different amount ranges and the various payment methods accepted by a retailer as revenue structures. The empirical data that our analysis relies on was gathered from a survey among Swiss retailers in autumn 2007. In the following, we will set the focus on one specific data set from a Swiss operator of small supermarkets and convenience stores. Its large share of micropayment transactions – defined as all payment ≤ 15 CHF[1] – makes its industry segment particularly suitable for the implementation of a new payment technology that specifically addresses small value transactions. This choice was made, because it is the card scheme operators declared intention to use contactless payment to target the market for small amount payments (MasterCard 2008).

Payment method specific costs. Each payment method is subject to its own individual cost and fee structure. Cost elements can be based on the number of transactions and the revenue. Card payment fees are considered confidential by, both, retailers and payment scheme operators. Approximate average card fees for the Swiss market were, however, obtained from the Swiss Association for Electronic Payment Transactions (cf. Table 2). The cash costs that we use in our calculations originate from company-internal figures of two large Swiss retailers, which both calculated cash payment costs independently of each other and came to similar results.

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[1] The separation between micro- and macropayments is not consistent in prior academic studies and usually varies between 5 and 20 €. We therefore chose 10 € (approximately 15 CHF) as mean value.

	Costs per transaction	Costs per revenue
Cash	0.00 CHF	0.25%
Debit Card	0.30 CHF	0.00%
Cash Card	0.02 CHF	0.07%
Credit Card	0.15 CHF	2.50%
Credit Card (Food Retail)	0.15 CHF	1.50%
Private Label Card (retailer operated)	0.00 CHF	0.00%

Table 2.   Payment cost factors

Substitution effects. This paper refers to the transfers of payment transactions and revenue between payment methods, caused by the implementation of a new payment method, as "substitution effects". The substitution effects are an unknown factor in the mathematical model which cannot be determined in advance. Additionally, they will differ between different countries and amongst retail industry segments, due to various influence factors. For this reason, we developed three distinct scenarios that cover various possible outcomes of the adoption process (cf. Table 3).

- Scenario 1 illustrates the transfer of payments from cash to credit cards in the micropayment ranges between 0 and 15 CHF. It assumes that 25% of all cash transactions for less than 15 CHF will be replaced by credit card payments.
- Scenario 2 represents the transfer of payments from cash to debit and credit cards in all amount ranges. 30% of the cash-based micropayments are assumed to be transferred to debit and credit card payments in equal shares. A smaller share of cash-paid macropayments (defined as all payment > 15 CHF) are also expected to be transferred: 20% of the cash payments between 15.01 and 50 CHF and 10% of those above 50 CHF are also assumed to be replaced by debit and credit card payments in equal shares. The transfer rates are assumed to be lower for macropayments, because these amount ranges already feature a higher card payment share than micropayments.
- Finally, scenario 3 includes the same substitution effects as scenario 2, however, it incorporates the possibility of retailer-operated store cards becoming more prominent due to the added convenience of contactless technologies. In contrast to the first two scenarios, scenario 3 not only includes the transfer of cash payment to other payment methods, but also the transfer payments from debit and credit cards to retailer-operated store card schemes.

Substitution Scenario	Transfer Rate		Amount Ranges (in CHF)					
	From	To	0-1	1-5	5-15	15-50	50-150	> 150
1	Cash	Credit Card	25%	25%	25%	-	-	-
2	Cash	Debit Card	15%	15%	15%	10%	5%	5%
		Credit Card	15%	15%	15%	10%	5%	5%
3	Cash	Debit Card	15%	15%	15%	10%	5%	5%
		Credit Card	15%	15%	15%	10%	5%	5%
		Store Card	15%	15%	15%	10%	5%	5%
	Debit	Store Card	15%	15%	15%	10%	5%	5%
	Credit	Store Card	15%	15%	15%	10%	5%	5%

Table 3.   Specification of substitution scenarios

Payment costs consist of two elements: The payment method specific transaction-based costs ($C_{Tb_i}^{Pay}$), which have to be paid for each transaction and the payment method specific revenue-based costs ($C_{Rb_i}^{Pay}$), which are proportional to the amount of a transaction. The multiplication of the transaction-based costs with the number of transactions settled with a payment method i (Tr_{old_i}) and the multiplication of the revenue-based costs with the revenue paid for with that payment method (SR_{old_i})

results in a retailer's costs for its use. The sum of payment costs for all payment methods accepted by a retailer equals that retailer's current total costs of payment (C_{old}^{Pay}).

$$C_{old}^{Pay} = \sum_{i=1}^{n} (C_{Tb\ i}^{Pay} * Tr_{old_i} + C_{Rb\ i}^{Pay} * SR_{old_i}) \tag{1}$$

The application of the substitution scenarios permits to give estimates of the future distribution of transactions onto payment methods and the new payment costs (C_{new}^{Pay}) caused by the implementation of the new payment technology. This model uses substitution effects, in the form of percentages to articulate which share of transactions (STr_{ji}) and revenue (SSR_{ji}) are transferred from one payment method to another after the introduction of the new payment technology. A payment method does not necessarily have to be solely a beneficiary or benefactor of a new payment technology. It is possible that a new payment technology may cause it to receive a share of the transactions (STr_{ji}) and revenue (SSR_{ji}) from some payment methods, while at the same time forfeiting a share of its own transactions (STr_{ij}) and revenue (SSR_{ij}) to others. The difference between the old payment costs and the new payment costs constitute the financial impact of the new payment technology:

$$\begin{aligned}C_{new}^{Pay} = \sum_{i=1}^{n} ((C_{Tb\ i}^{Pay} * (Tr_{old_i} + \sum_{j=1}^{n} \left(Tr_{old_j} * STr_{ji}\right) - \sum_{j=1}^{n} \left(Tr_{old_i} * STr_{ij}\right))) \\ + (C_{Rb\ i}^{Pay} * (SR_{old_i} + \sum_{j=1}^{n} (SR_{old_j} * SSR_{ji}) - \sum_{j=1}^{n} (SR_{old_i} * SSR_{ij}))))\end{aligned} \tag{2}$$

When interpreting our results, it should be noted that our approach comes along with a number of modeling assumptions, which might limit its applicability in practice. First, we arbitrarily separate micropayments ($\leq$ 15 CHF) and macropayments (>15 CHF) and restricts the growth in sales to the first. It is, however, possible that a new payment technology could lead to increased sales among large amount transactions as well, even if it might do so to a smaller extent. Secondly, we assume that payment costs increase linearly to the growth in sales, i.e. the transactions caused by the implementation of the new payment technology have the same average value than the previous micropayment transactions. Thirdly, the model does not account for infrastructure investments that are necessary on the part of the retailer. These are excluded for two reasons: On the one hand, the investment costs are complex and strongly dependent on a retailer's existing point-of-sale and payment terminal infrastructure, and can thus not be generalized. On the other hand, card fees constitute a more significant amount of money than hardware does. Finally, the model does not account for cost savings which might be possible through the acceleration of the check-out process. If a new payment technology could accelerate this process, it might lead to a reduced need for cashiers and checkouts. This could decrease the retailers operating costs and refinance a part of the possible additional costs. These potential savings were not integrated into the model due to the high uncertainty with regard to their realization and to the level to which they are dependent on store formats and sites.

4 EVALUATION

4.1 Case Description

The retailer that we consider in the following is one of the largest food retailers in Switzerland with approximately 600 small supermarkets and convenience stores, and an annual revenue of 1 billion CHF. In their case, the 40 million annual sales transactions are mostly micropayments, i.e. 61.61% of all transactions are valued at less than 15 CHF, while only 2.8% are above 50 CHF (cf. Figure 1). With regard to revenues, on the other hand, micropayments amount to 24.93% only, whereas macropayments account for 75.07%. The large number of micropayments represents a significant potential for a novel payment technology focused on the convenient settlement of small value

transactions. While a large share of the customers' purchases are probably planned based on specific household needs, supermarkets and convenience stores can also incite their customers to make spontaneous purchases. A new convenient payment method which frees the shoppers from having to carry cash could thus lead to a significant growth in sales through higher spending per purchase.
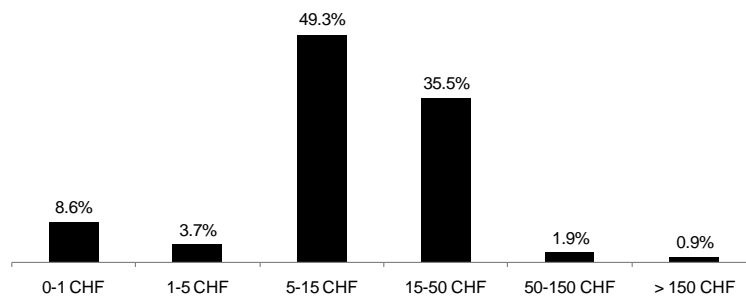

Figure 1.   Distribution of transaction volume across payment ranges

As Figure 2 illustrates, the shares of cash payment in the micropayment and the macropayment area differ strongly. 82.84% of the sales transactions in the respondent's stores are paid in cash, 16.81% with debit cards, and only 0.33% with credit cards since the supermarket operator only accepts credit cards in those stores that are located in tourist areas. Cash cards are not accepted. The retailer neither offers gift certificates nor a self-operated store card. While 99.6 % of the micropayment transactions are settled in cash, the same holds for only 55.94% of the macropayment transactions. With higher payment amounts, the card payment quota increases amongst micropayments and decreases amongst macropayments. This is in part due to the fact that some commercial customers, such as restaurants, are allowed to pay on account (i.e. 0.01% of transactions).
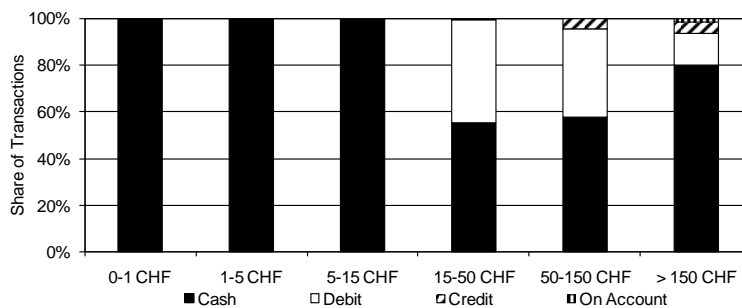

Figure 2.   Payment method use by payment range

4.2   Payment Costs

The company's current average payment costs amount to 0.09 CHF per transaction, and 0.44 CHF per 100 CHF of revenue. The financial impact with regard to the implementation of NFC based payment that we calculated from our model in the three substitution scenarios is given in Table 4. The figures show that the implementation of NFC based contactless payment would cost the retailer additional money in the occurrence of any of the three proposed scenarios. Scenario 1 causes the lowest costs, because cost increases are limited to micropayments. Scenario 2 causes the highest additional costs since a significant share of large value payments are moved from cash to the more expensive debit and credit cards. An occurrence of scenario 3 would be less expensive than scenario 2 for two reasons: Firstly, some of the cheap large value cash payments are transferred to the even cheaper private label payment card. Secondly, some of the more expensive credit and debit cards are considered to be transferred to a private label card as well, and thereby reduce the cost increase.

In all three scenarios, the costs for micropayments would increase by between 290% and 366% when compared to the company's current payment costs. The costs for macropayments on the other hand would not increase in the occurrence of scenario 1, and increase by only 22.16% and 12.95% in the occurrence of scenarios 2 and 3, respectively. This is due to the fact that (a) our scenarios assume a higher substitution rate for lower amount payments, and (b) that the current card payment share is higher in the macropayment range, thus already causing higher payment costs for macropayments.

		Cost per transaction [CHF]	Cost per 100 CHF revenue [CHF]	Increase	Total payment cost [CHF]
Current	All Payments	0.09	0.44	-	4,398,329
	Micropayments	0.02	0.26	-	
	Macropayments	0.20	0.50	-	
Scenario 1	All Payments	0.13	0.63	43.26%	6,301,066
	Micropayments	0.08	1.03	289.95%	
	Macropayments	0.20	0.50	0.00%	
Scenario 2	All Payments	0.16	0.76	73.46%	7,629,130
	Micropayments	0.10	1.23	365.98%	
	Macropayments	0.24	0.61	22.16%	
Scenario 3	All Payments	0.15	0.72	63.38%	7,186,101
	Micropayments	0.10	1.19	350.98%	
	Macropayments	0.22	0.56	12.95%	

Table 4.   Payment cost before and after NFC implementation

According to these results, it seems that the implementation of NFC based contactless payment would, in any case, substantially increase payment costs. Adopting retailers would thus either have to achieve additional sales that enable them to recoup some of these costs, or be willing to relinquish a share of their return on sales to the payment scheme operators. Otherwise, the retailer would have to make the implementation of contactless payment depend on a reduction of payment fees. These reductions could be applied globally onto all payments or be restricted to small amount payments.

4.3   Growth in Sales

One way of neutralizing increased payment costs is additional earnings achieved through growth in sales. The model underlying the presented results restricts the growth in sales to the micropayment area. This assumption is based on the premise that micropayments are much more likely to be characterized as spontaneous purchases whose number could increase due to a more convenient shopping environment than macropayments. The growth in sales necessary to cover for higher payment costs is dependent on a retailer's margin, which determines his earnings. The lower a retailer's margin, the greater the additional sales need to be in order to produce the additional earnings necessary to outbalance additional payment costs. The contour lines (i.e. isobenefit curves) in Figure 3 describe these interrelations for the three substitution scenarios. All growth in sales/return on sales combinations below the lines would lead to a negative financial impact on the retailer, while all combinations above the lines indicate a positive impact of the NFC implementation.

• On the occurrence of scenario 1, a return on sales of 3.3% or lower would not enable the respondent to cover the increased payment costs through a growth in sales at all. At a margin of 4% the retailer, for instance, would have to increase his micropayment sales by 112%. A 50% growth in sales, which surmounts the sales increases proposed by MasterCard and Visa (MasterCard 2008, Visa 2008), would only suffice to cover the additional cost of payment if the retailer's margin is 4.8% of revenue or more.

- In the event of scenario 2, a return on sales of 3.4% or lower would not enable the respondent to cover the increased payment costs through a growth in sales at all. At a margin of 4.5% the retailer would have to increase his micropayment sales by 126%. A 50% growth in sales would only suffice to cover the additional cost of payment if the retailer's margin is 6% of revenue or more.
- On the occurrence of scenario 3, a return on sales of 2.3% and lower would not enable the respondent to cover the increased payment costs through a growth in sales at all. At a margin of 3% the retailer would have to increase his micropayment sales by 165%. A 50% growth in sales would only suffice to cover the additional cost if the retailer's margin is 4.5% of revenue or more.
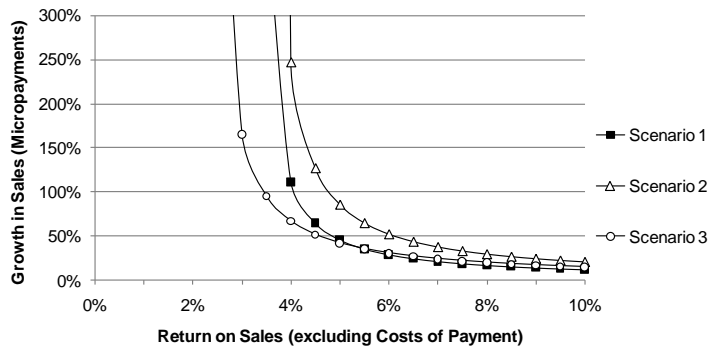

Figure 3.   Growth in Sales Necessary to even out Payment Cost Increase

The curves representing scenarios 2 and 3 resemble each other because both scenarios influence payment transactions in all amount ranges and have similar substitution effects. The difference between them is the enhanced role of the store card in scenario 3, responsible for the lower necessary growth in sales rates for all possible return on sales rates. On the other hand, the curve representing scenario 1 stands out due to its different shape and the fact that it intersects the curve representing scenario 3. This is due to the fact that scenario 1 aims only at micropayments thus representing a very different setting. When interpreting the necessary growth in sales rates in Figure 3, it has to be kept in mind that micropayments represent only 24.93% of the respondent's revenue. A growth in sales of 100%, restricted to micropayments, thus only equates to a total growth in sales of 24.93%.

4.4   Card Fee Reduction and Micropayment Discount

The costs caused by the implementation of NFC could also be partially or fully balanced out by an overall reduction of payment fees or a special discounted fee restricted to micropayments. Should the implementation of contactless payment not lead to a growth in sales at all, the supermarket operator would have to negotiate fee reductions of 84.03% (scenario 1), 51.42% (scenario 2), or 46.26% (scenario 3). If the implementation of contactless payment were to lead to a growth in sales, the answer to the question concerning necessary card fee reductions becomes more complex. In this case, the reduction necessary is, as is the growth in sales discussed beforehand, dependent on the retailer's margin. This is due to the fact that a growth in sales also leads to an increase in payment costs, due to the higher number of transactions and the increased revenue.

If the retailer's margin is lower than the average payment costs of the new transactions, the reduction of fees that is necessary increases when compared to a situation without growth in sales. If, on the other hand, the retailer's margin is higher than the average payment cost incurred by the new transactions, the reduction necessary to balance out the cost of contactless payment implementation becomes lower. Figure 4 shows the necessary card fee reductions in a highly optimistic case of 50% growth in sales – restricted to micropayment sales – for all three substitution scenarios.

If we assume that fee reductions are given only for micropayments, the retailer would have to negotiate for discounts of 92.47% (scenario 1), 123.13% (scenario 2), and 106.47% (scenario 3) if the implementation of contactless payment does not lead to any growth in sales at all. On the occurrence

of scenarios 2 and 3 without any growth in sales, the payment scheme operators would actually have to subsidize the retailer for each micropayment transaction, so that the retailer is able to pay the additional costs for macropayments with this income. This clearly does not seem to be a realistic outcome for negotiations between payment scheme operators and retailers. The cost increases on the occurrence of scenarios 2 and 3 could however be neutralized by a micropayment discount, provided that the implementation of contactless payment leads to a growth in sales. As depicted in Figure 5 (also in case of 50% growth in sales), the necessary micropayment discounts become dependent on the retailer's return on sales in the case of additional sales incurred by the implementation of NFC based contactless payment.
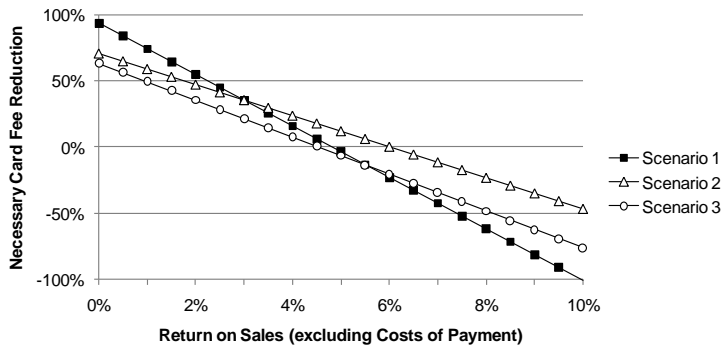

Figure 4.   Necessary card fee reduction in case of 50% growth in sales
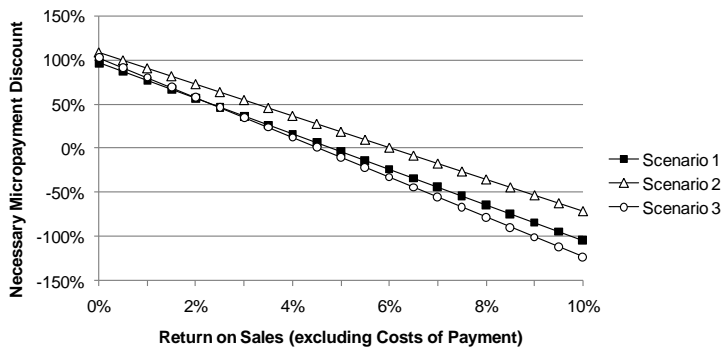

Figure 5.   Necessary micropayment discount in case of 50% growth in sales

5   CONCLUSION

This paper concerned itself with the question of how the implementation of NFC-based contactless payment would affect the payment costs of stationary retailers. As our numerical results indicate, the introduction of NFC based contactless payment under current card fee models would in virtually any case significantly increase the payment costs for retailers. This is due to the transfer of payment transactions and revenue from low cost settlement with cash to more costly card payments. Ceteris paribus these increased costs would lead to a reduction of the retailer's profit. While the results in this paper are based solely on the analysis of one retailer's data, the authors validated the results using the data from three further retailers which led to consistent results.

There are, however, various means to recoup a share of the additional costs. Firstly, the implementation of NFC-based payment could cause a growth in sales due to the elevated transaction convenience and the fact that the shoppers' expenditure is not curtailed by the amount of cash they carry. However, the growth rates necessary to neutralize the increased costs are substantial.

Secondly, a reduction in card fees for all transactions or, alternatively, a discount restricted to small amount payments could reduce or neutralize the payment cost increase as well. In the event of the proposed substitution scenarios occurring, the overall reduction in card fees would have to lie between 46.4% and 84%, while the micropayment discount would have to amount to between 92.5% and 123.1%. A discount beyond 100% implies that the payment scheme operators would have to subsidize the retailer for each micropayment transaction, so that the retailer is able to pay the additional costs for macropayments. This clearly does not seem to be a realistic outcome for negotiations between payment scheme operators and retailers. If the implementation of contactless payment were to lead to a growth in sales, the answer to the question concerning necessary card fee reductions becomes more complex. In this case, the reduction necessary is, as is the growth in sales discussed beforehand, dependent on the retailer's margin. If the card scheme operators are not willing to agree to lower card fees, the implementation of a retailer operated store card constitutes an alternative.

While lower transaction fees would make the processing of small payments a less attractive source of revenue for the payment service providers, the launch of such a service could become a means to save costs, especially for the issuer banks, which retain a large share of the card fee revenues. In general, a cardholder's issuer bank is also the institute at which he has his bank account and where he obtains cash at ATMs. The transfer of payments from cash to NFC-based cards would very likely result in less cash withdrawals, thus leading to a reduction in cash provisioning costs for issuer banks. Banks could seek further savings by delivering payment cards to NFC devices over the air instead of sending plastic cards by postal service. These possible savings should be a part of the considerations when pricing NFC-based payment services.

Additional costs that cannot be compensated by a growth in sales, lower fees or operating cost savings have to be considered as the retailer's price for the implementation of NFC based contactless payment. Each retailer has to decide individually, whether the implementation of contactless payment is worth this price. Criteria favoring retailers to spend money on the new payment technology are increased customer convenience due to faster payment transactions, quicker check-out processes and possible added value trough other contactless customer services such as loyalty cards, coupons or seamless combinations of different services.

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