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Evidence from the
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* Views expressed are those of the authors and do not necessarily reflect official positions of De Nederlandsche Bank.

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Does a public campaign influence debit card usage? Evidence from the Netherlands

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Abstract:

Do consumers change their payment behaviour after being exposed to a public campaign that encourages them to use their debit cards more often? We analyse the impact of such a campaign that started in 2007, using weekly debit card transaction data between 2005 and 2013. The overall results show positive effects of a national campaign to promote debit card usage, both in the short and in the long run. Debit card usage increased by 2%. The effects are the most significant at the early stages of the campaign, while appearing to wear off after a few years of interventions. The results suggest that high campaign intensity had a positive impact, as did a focus on certain large retail chains.

Keywords: debit cards, payment behaviour, social marketing, cost efficiency, safety.

JEL classifications: D24, E42, G21, M31, M37.

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1. INTRODUCTION

Consumers often have a choice of different means of payment at a point-of-sale (POS). Traditionally, they mainly used paper-based instruments such as cash or cheques, but since the introduction of payment cards, card usage has slowly increased at the expense of cash and cheque payments. However, in most Western countries cash is still the dominant payment instrument in terms of number of transactions (Schmiedel, Kostova and Ruttenberg, 2013, Bagnall et al., 2014).

In the Netherlands, cash is universally accepted, and debit card acceptance among retailers is very high and continues to grow. All large retail chains and petrol stations accept debit card payments, as well as the majority of small and medium-sized shops and catering establishments (Panteia, 2013). In 2013, consumers used cash 3.8 billion times in POS payments, representing a value of EUR 47 billion and debit cards 2.7 billion times, representing a total value of EUR 85 billion (De Nederlandsche Bank (DNB)/Dutch Payments Association (DPA) 2014).¹

Payment instruments differ in several aspects such as ease of use, transaction speed, anonymity, costs and safety. Overall, an increase in debit card usage at the expense of paper-based payment instruments may be beneficial for society as it enhances safety and contributes to a more cost-efficient payment system. Increased card usage benefits safety as it lowers the risks for cash theft and robbery. In addition, it reduces the costs made by banks and retailers for POS payments in countries where card usage is sufficiently high to benefit from economies of scale (Brits and Winder, 2005, Danmarks Nationalbank, 2012, Gresvik & Haare, 2009, Jonker, 2013, Schmiedel et al. 2013, Segendorf and Jansson, 2012). The National Forum on the Payment System (the Forum) announced in its annual accounts for 2006 that “[t]here are plenty of opportunities to step up efficiency. Banks and retailers are working, within the Forum and in other ways, on concrete measures to encourage the wider use of debit cards. This is a way of further reducing the use of banknotes and coins, which carry relatively high social costs”.²

Market participants in the Netherlands and abroad have tried to stimulate card usage in several ways. Financial incentives such as reward programmes or surcharges on cash withdrawals steer consumers towards higher debit card usage (Bolt, Jonker and Van Renselaar, 2010, Borzekowski, Kiser and

¹ In the Netherlands almost all adults have a current account and a debit card that they can use for cash withdrawals and for making POS payments, both of which are free of any transaction fees. Reward programmes for debit or credit card payments are uncommon. Apart from cash and debit cards, people can also use credit cards or prepaid cards; these payments represent only a few percent of all POS payments.

² The Forum was instigated in 2002 at the request of the Minister of Finance to contribute to a socially efficient organisation of the Dutch retail payment system. It was established in 2003. The Forum represents both providers and users of payment systems, including retailers’ and banks’ umbrella organisations, the *Consumentenbond* consumer interest association and elderly and disabled people’s organisations.

Ahmed, 2008, Carbó-Valverde and Liñares-Zegarra, 2011 and Verdier 2011). However, even if market participants provide the right incentives to consumers, the latter's payment behaviour changes only gradually, as it is strongly rooted in their daily routines. These daily routines are hard to break, even if consumers themselves indicate that they value debit card payments over cash ones (Jonker, 2007, Plooi, 2014). An alternative is to launch a public campaign encouraging consumers to use their debit cards more often by highlighting the desirability and (social) benefits of such behaviour. Such a campaign may stimulate pro-social (payment) behaviour by consumers, i.e. payment behaviour that is beneficial to society, see e.g. Helmig and Thaler (2010).

In the Netherlands, banks and retailers together launched a public campaign, starting in 2007. Their aim was to increase safety and reduce costs by stimulating consumers to use their debit cards. The campaign consisted of several mostly nationwide interventions and some regional ones clustered in time. As far as we know, the influence of such a campaign on consumers' card usage has never been considered in the literature. This paper aims to fill the gap and provide new insights into the effectiveness of a campaign promoting pro-social payment behaviour by consumers. We studied the influence of said campaign by addressing the following three questions.

- *Does a public campaign influence consumers' debit card usage, and, if so, does it change their behaviour temporarily or for a longer period of time?*
- *Does the introduction of a new slogan lead to a change in consumers' debit card usage at the POS?*
- *Do local interventions influence consumers' debit card usage, and, if so, are there any spill-over effects to nearby regions as well?*

We used a dataset containing the weekly number of debit card payments by four digit ZIP for the Netherlands between 2005 and 2013 provided by automated clearing house (ACH) Equens. We combined this data with information on the timing and nature of individual interventions that were part of the campaign.

First of all, we found evidence of a public campaign leading to increased debit card usage by consumers. The change in payment behaviour also holds in the long run. However, a long-term effect seems to be present only if the campaign intensity is high and diminishes over time. The most effective intervention was the one focused on consumers who already use their debit cards, to expand their usage to new situations. Secondly, we found no evidence of a change in the campaign slogan leading to increased debit card usage. Thirdly, we have mixed findings with respect to the impact of local interventions. It turns out to be difficult to separate the effects of regional interventions from those of nationwide interventions taking place at the same time.

Our findings are relevant to policy makers, payment service providers and retailers who want to influence consumers' payment behaviour at the POS. In addition, they may also provide useful insights for policy makers active in other fields.

This paper is structured as follows: Section 2 presents an overview of the relevant literature; it includes studies on payments and on social marketing. Section 3 discusses the nature of the campaign. Section 4 lists the main research questions and Section 5 discusses the data and the research approach. Section 6 then discusses the estimation results as well as the implications for social costs of the payment system. Finally, Section 7 provides a summary and concluding remarks.

2. REVIEW OF THE LITERATURE

2.1 Literature on payments

During the past decades, the payment habits of consumers worldwide have changed considerably. Traditional means of payment have been substituted by electronic payment instruments. There is empirical evidence that the substitution of cash by card payments reduces the social costs of the payment system (Brits and Winder, 2005, Danmarks Nationalbank, 2012, Gresvik and Haare, 2009, Jonker, 2013, Schmiedel et al., 2013 and Segendorf and Jansson, 2012). Social costs refer to costs incurred in the payment chain by the central bank, commercial banks, cash in transit companies, ACHs, retailers and telecom companies.

A vast amount of research has been performed on the drivers behind consumers' choices between different means of payment at a POS; see Bolt and Chakravorti (2012) or Kosse (2014) for comprehensive and up to date summaries. In general, consumers' payment choices depend on demographic characteristics, transaction characteristics and situational factors. Regarding transaction characteristics, card usage increases with transaction value. This is partly due to differences in card acceptance between sectors that differ in average transaction amount, see e.g. Bagnall et al. (2014). In addition, there is some evidence that people's payment choices are made unconsciously and to a large extent depend on habits (Van der Crujsen, Hernandez and Jonker, 2014 and Van der Horst and Matthijsen, 2013), although Eschelbach and Schmidt (2013) show that German consumers do make conscious decisions about which payment instruments they use by taking into account future barriers in using cash and cards when making payments.

Market participants have tried to steer consumers towards card payments using financial incentives; see Verdier (2011) for an overview. In the two-sided market literature, the card payments market is considered to be a market with two groups of end-users, being consumers and retailers. Banks work

together in a card network by setting transaction fees that will encourage card usage by consumers and card acceptance by retailers. As consumers are considered to be more sensitive to price than retailers, transaction fees for consumers are usually set at zero or are even negative, whereas those for retailers are above zero. However, retailers are allowed to ask their customers a fee for card usage. Most consumers will avoid paying this fee by using cash instead (Bolt et al., 2010). Retailers who put a surcharge on debit card payments have on average 8.5 percentage points fewer debit card payments than similar shops that do not do so. Surcharges for card usage at the POS imposed by banks have a similar impact (Borzekowski, Kiser and Ahmed, 2008). Positive financial incentives such as those provided in card reward programs fuel consumers' card usage (Ching and Hayashi, 2010, Simon, Smith and West, 2010 and Carbó-Valverde and Liñares-Zegarra, 2011). Findings on the precise impact of reward programs are not conclusive, perhaps due to cross-country differences in payment institutions or payment habits. Kosse (2013) shows that consumers also react to news articles on card fraud. Such articles depress debit card usage by a few per cent. This effect only lasts one day. No evidence of long-term effects has been found.

2.2 Marketing and social marketing

In the payments literature, little attention has been paid to the effect of public campaigns on payment behaviour. Marketing research provides some insights that may be applicable to debit card promotion campaigns. Since the aim of the campaign in the Netherlands was to change people's behaviour for the good of society, social marketing in particular may provide useful insights. Andreasen (1994) defines social marketing as "the adaptation of commercial marketing technologies to programs designed to influence the voluntary behavior of target audiences to improve their personal welfare and that of the society of which they are a part." Social marketing is used in many different fields, including public health, traffic safety and environmental protection. Stead et al. (2007) identify four important aspects of social marketing: 1) a focus on voluntary behaviour, 2) the application of the principle of exchange (i.e.: there must be some benefit for the target audience in order to induce a behavioural change), 3) the use of marketing techniques such as market research, segmentation and targeting, as well as the marketing mix, and 4) the ultimate goal being the improvement of individual and social welfare. Many social marketing campaigns, as well as marketing campaigns in general (see Vakratsas and Ambler, 1999) are aimed at first changing people's attitudes, then their intentions and finally their behaviour. In evaluations of social marketing campaigns, often attitude or intention change is measured, rather than the final behavioural change. Hence, Helmig and Thaler (2010) recommend that more studies are carried out measuring behavioural change, as well as research focused on long-term impact rather than short-term effects.

Research on social marketing has identified several factors influencing its effectiveness. Helmig and Thaler (2010) have provided an overview, identifying two general categories of relevant independent

variables: general campaign characteristics and framing determinants. General characteristics of the campaign include scope and targeting, channels and interactive elements. When it comes to geographical scope, campaigns with a broader scope show better results when it comes to behavioural change. Results of targeting are mixed, messages focused on a small group being more effective in changing intentions, but campaigns focused on the general public being more successful in changing behaviour. Regarding media channels, mass media campaigns have been shown to positively affect both attitude and behavioural change, audio channels being particularly effective in changing behaviour. Interactive elements have been shown to increase the effectiveness of campaigns. The framing determinants distinguished by Helmig and Thaler are focus, direction (i.e. positive or negative), tonality (i.e. emotional, normative or rational), time horizon and content. Self-focused messages, showing the effects on the individual, are effective in campaigns targeting smoking and drinking and driving. Other-focused messages, showing the effects on others or on society as a whole, are effective in campaigns promoting environmental protection. Both positive and negative messages can be effective, depending on other variables. Emotional messages tend to be more effective than normative and rational messages. The time horizon of the effects on the behaviour the campaign intends to change is also important, but its effect depends on other moderating variables such as gender, age and other personal characteristics. Finally, the effectiveness of a campaign can be influenced by its content, i.e. whether there are multiple messages being conveyed in one campaign, how the desired behaviour is described, etc.

Since social marketing differs from commercial marketing only in its goals, and not in its methods, insights from commercial marketing can also be useful for social marketing. Sethuraman, Tellis and Briesch (2011) for example find that advertising elasticity (defined as “the percentage increase in sales or market share for a one percent increase in advertising”) is higher during recessions, for durable goods and for products at the growth stage of their life cycle. There are also differences between regions, with advertising elasticity in Europe being higher than in the US, possibly due to under-advertising in Europe vs. optimum or over-advertising in the US. TV advertising has higher short-run elasticity than printed advertising, but lower long-run elasticity. The effects of marketing campaigns tend to last only a short time, a phenomenon termed campaign decay (Tellis, 2004). Social marketing campaigns, in particular tobacco control campaigns, have been shown to exhibit campaign decay as well (Durkin, Brennan and Wakefield, 2012). Although research on the intensity of campaigns is limited, results indicate that the relationship between intensity and output may not be linear. At very low levels, there may be little to no effect, due to the audience not retaining the message. On the other hand, at very high levels, the audience may become saturated, meaning that additional effort may not increase the effects of the campaign. If the audience gets bored or annoyed by a campaign that is either very intense or very long, there may even be adverse effects. However, at which intensity or duration this phenomenon occurs depends on other factors such as complexity, emotional appeal, etc. (Tellis,

2004). Wansink and Ray (1996) show that advertisements focused on expanding already existing behaviour to new situations are more effective than ads aimed at substituting new behaviour for existing behaviour. For example, a company trying to convince people to eat soup for breakfast would have more success with ads that promote eating soup not only for lunch, but also for breakfast, than with ads that promote eating soup for breakfast instead of cereal.

3. DEBIT CARD RELATED PUBLIC CAMPAIGNS

3.1 Nationwide public campaigns

First campaigns in the 1990s

Banks introduced debit cards in the Netherlands in 1987. At first, consumers were only able to use their debit cards to withdraw cash from automated teller machines (ATMs), but from 1990 onwards debit cards could also be used to pay for purchases at a few points of sale. Figure 1 shows the annual growth in the number of POS debit card payments. During the first years there was a campaign encouraging consumers to use debit cards for medium and high transaction values. During these years annual growth was very high; sometimes debit card usage even doubled.

During the mid-1990s a second campaign was launched focussing on improving the safety measures taken by consumers. It highlighted the fact that consumers should never share their personal identification numbers in order to make sure that their debit cards could not be abused.

Nationwide campaign to increase debit card usage

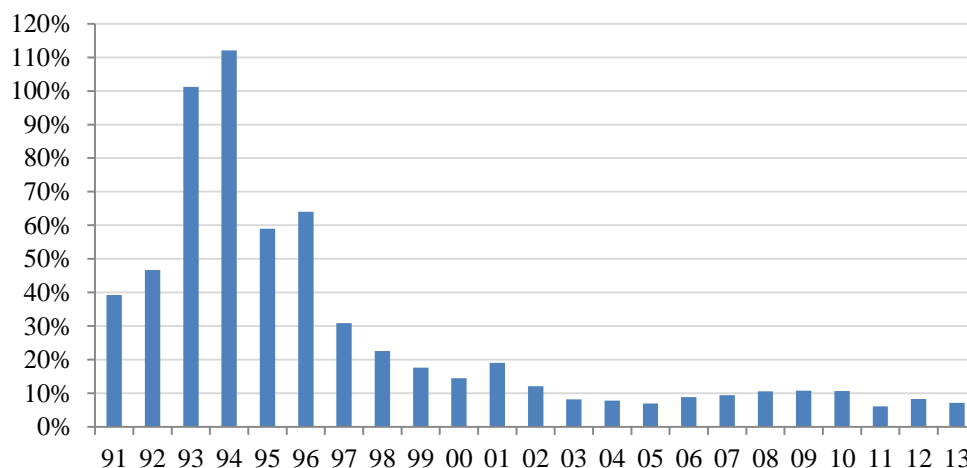
After 2003, the annual growth rates of debit card usage dropped well below 10%. However, Brits and Winder (2005) showed that both banks and retailers could save costs by promoting card usage at the expense of cash. Brits and Winder revealed that in 2002 debit card payments were the most cost effective payment instrument for most transaction amounts. Only for purchases below EUR 11.63 were cash payments more cost effective.³ In 2002, the average transaction amount of a debit card payment was EUR 44.13. Consequently, cost savings for society could be achieved if consumers used their debit cards also for medium-sized and low amounts. In November 2005, banks and retailers agreed on several measures to promote the use of debit cards, thus reducing costs and increasing the security of the payment system. One of these measures was the creation of the Foundation for the Promotion of Efficiency in Payments (FPEP). Among its key activities are awareness-raising

³ Jonker (2013) showed that between 2002 and 2009 the threshold level had dropped to EUR 3.06. So, from 2009 onwards debit card usage was most cost effective for almost any transaction amount.

campaigns and promotional activities targeting retailers. Additionally, Currence, which at the time owned the Dutch debit card scheme PIN, developed a consumer campaign in cooperation with the FPEP.

Figure 1: Debit card usage in the Netherlands, 1991 - 2013

y-o-y growth rate in number of transactions



Source: Dutch Payments Association

The consumer campaign did not focus on substituting card payments for cash payments, but rather used a behaviour expansion strategy, encouraging consumers who were already using their debit cards to make medium-size and high-value payments to also use it for low value payments. This strategy was mainly used between 2007 and the first half of 2012, under the slogan *Klein bedrag? Pinnen mag!* (KBPM), which roughly translates as “Paying a small amount? Feel free to use your debit card!”. In 2012/3 FPEP decided to change the message, as it believed that this slogan had lost its power. In 2012 it changed to *U pint toch ook? - (UPTO)*, which translates as “Why not use your debit card?” and in May 2013 it launched its third slogan: *Pinnen? Ja, graag!* (PJG), which translates as “Debit card? Yes, please!”. These new slogans promoted debit card payments in general, rather than focusing on low value payments.

The national campaign included mass media (television and radio commercials, billboards, online advertising), social media (PJG only), as well as promotional materials at the POS and what were called “Pin & win” interventions, where people using their debit cards could win prizes. In 2010 a “debit card week” was organised; in the following years the campaign was intensified during the national “security week”. The KBPM campaign focused on supermarkets at first, and was later expanded into other branches like large retail chains (FPEP 2009, 2010, 2011, 2012, 2013). An important aspect of the campaign was the use of retailers to put the message across, instead of Currence communicating directly to consumers (Adformatie 2010).

3.2 Local campaigns

In addition to the national campaign, there were several local campaigns, focussing on a specific town or shopping centre. These were underpinned by local media attention and the support of local shopkeepers. The first local campaign was launched in Almere Stad (77,000 inhabitants in 2007) , where the main aim was to reduce the amount of cash held in shops in order to discourage robbery. The campaign was organised by the city council, local retailers and Currence. The apparent success of the campaign in Almere Stad inspired similar campaigns in other towns. The local campaigns focused around “100% debit card areas”, where all shops accepted debit card payments. This was intended to resolve uncertainty among consumers about whether debit cards were accepted or not. “Pin & win” interventions were also an important part of the local campaigns (FPEP, 2013).

3.3 Consumers’ perceptions towards debit card payments

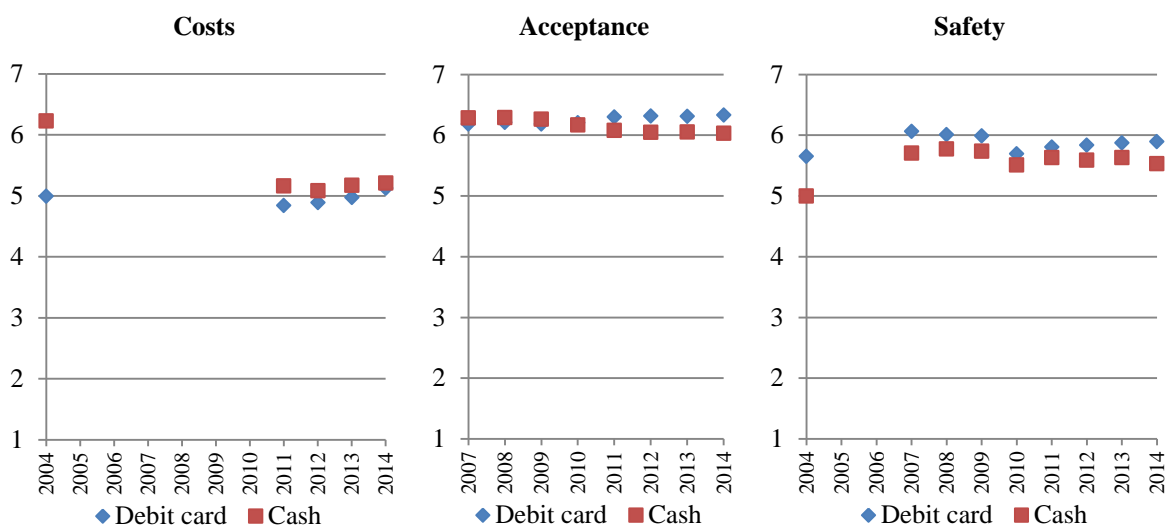
Since the earliest debit card campaign in the 1990s focused on medium-size and high-value payments, many consumers were under the impression that debit card payments were less cost efficient than cash payments. This notion was underlined by surcharges applied by retailers for low-value debit card payments. Research by Currence shows that during the first phase of the campaign there was a shift from a general preference for cash towards one for using cash only for low amounts, and from preferring cash for low amounts towards preferring debit cards for all transaction sizes. However, in 2010, 35% of consumers were still under the impression that paying small amounts by debit card was not appreciated by retailers, and 26% thought that small retailers disliked debit card payments in general (Toth, Van Vreden and Van Ossenbruggen 2010).

The campaigns also appear to have been successful in increasing debit card acceptance by smaller retailers: between 2006 and 2011, debit card acceptance increased from 82% to 92%.⁴ Surcharging for low-value debit card transactions also became less common. While in 2006 22% of retailers applied a surcharge, by 2010 this had dropped to 2% (HBD 2011). Results from the DNB household survey⁵ show a small but significant improvement in consumers’ perceptions of debit card acceptance from 2010-2011, coinciding with a slight decline in their attitudes towards the acceptance of cash. Nevertheless, it should be noted that the actual acceptance of cash is still almost 100% in every sector, whereas the acceptance of debit cards is considerably below 100% in some sectors, such as street trading and catering (Wils, Hoevenagel and Van der Zeijden, 2012).

⁴ This number does not include street trading and catering, two sectors with relatively low acceptance rates.

⁵ The DNB household survey is held among about 2,000 Dutch households that are members of the CentERpanel, which is managed by the CentERdata research institute. The panel members are fairly representative for the Dutch speaking population.

Figure 2: Consumers' perceptions of characteristics of debit card and cash payments (scale 1-7)



Survey results also show small but significant changes in the perceived costs and safety of cash and card payments. When it comes to costs, the pre-campaign difference in favour of cash has almost completely disappeared. As for the perceived safety of the debit card: after dropping in 2010 – which may be explained by news about skimming fraud – in the later years of the campaign safety perceptions improved again. As the perceived safety of cash remained more or less unchanged during the same period, this means that the already existing difference in favour of the debit card increased.

4. RESEARCH QUESTIONS

The ultimate goal of public campaigns is to influence people's behaviour. Our first research question therefore was: *Do public campaigns influence consumers' debit card usage, and, if so, do consumers change their behaviour temporarily or for a longer period of time?* During the first years of the campaign consumers were invited to expand the use of their debit cards in POS locations where debit card usage for medium and high-value payments was already quite common. This new use seems to be relatively congruent with the existing consumer usage schemes and was therefore likely to be evaluated favourably by consumers. Consequently, we expect that interventions taken in the course of the public campaign positively influenced debit card usage by consumers.

In the later years of the KBPM slogan, interventions were taken in order to encourage consumers to use their debit cards more often in situations where its use was rather uncommon, such as in the catering industry and on street markets. As a result, consumers may have experienced a stronger discrepancy between the existing payment behaviour and the proposed behaviour than during the first years of the campaign. This may have hampered the transfer of these later interventions to real

payment situations. Consequently, we believe that the influence of the campaign diminished over time.

During the first years of the campaign the effects may have been temporary as it takes repetition of debit card usage (Triandis, 1980, Wood and Quinn, 2005) before intention to use a debit card is translated into actual daily payment behaviour. However, in the long run, when people got used to paying by debit card, the campaigns may have led to increased use of debit cards.

Our second research question: *Does the introduction of a new campaign slogan lead to a change in consumers' debit card usage at the point of sale?* is about the impact of using a new slogan on debit card usage. We examined whether the introduction of the new UPTO and PJG slogans led to changes in payment behaviour. The new slogans and the new content of the interventions may have stimulated pro-social payment behaviour of new groups of consumers who want to contribute to the safety of shopkeepers by using debit cards instead of cash. Compared to the KBPM slogan, the wording of the PJG slogan expresses more clearly that retailers really appreciate debit card usage by their customers, irrespective of the amount involved in the transaction. Some consumers may have interpreted the KBPM slogan to the effect that retailers only permitted them to use their debit cards for small amounts, although these retailers may not necessarily prefer debit cards to cash. The impact of the wording of the UPTO slogan on consumers is less clear; it may be perceived as inviting, but it may also be perceived as slightly intimidating, as if consumers are behind the times if they prefer cash to debit cards. All in all, we expect that the effect of the new slogans was higher than the impact of the KBPM slogan during its last years.

Our third research question was: *Do local interventions influence consumers' debit card usage, and if so are there any additional spill-over effects to nearby regions?* We expect that local interventions influenced consumers' debit card usage positively. In contrast with the national public campaign, consumers in the local campaign were informed about the desirability of debit card usage both in local newspapers and in the actual shopping centre. Consequently, they could immediately adjust their payment behaviour after being exposed to local interventions. The force of the impact of the local interventions may depend on the intensity of the support given by local shopkeepers. In the town of Almere Stad, local support was very strong as increased debit card usage at the expense of cash was considered to contribute towards safety in the shopping centre. Consequently, these interventions may have triggered pro-social behaviour more strongly than in other towns.

Shopping centres are mainly visited by consumers who live or work nearby. However, people living at some distance of a shopping centre also receive local newspapers and visit the shopping centre every now and then. Hence, we also expect to see some effect of a local intervention on debit card usage in

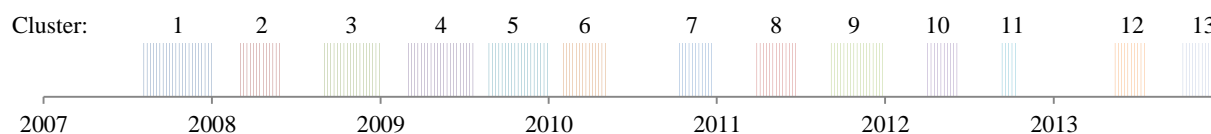
nearby towns. However, the effect is likely to be less strong than in the shopping centre where the intervention took place.

5. DATA DESCRIPTION AND METHODOLOGY

5.1 Data

We used several datasets for this study including debit card transaction data provided by Equens. This includes the weekly number of debit card payments by four digit ZIP code made in the Netherlands with debit cards issued by Dutch banks in the Netherlands between 2005 and 2013.⁶ We also used information supplied by the DPA on the weeks in which the interventions took place, the relevant retail chains or branches, the relevant towns and the target groups: consumers and/or retailers. In total there were 57 nationwide interventions and five regional interventions in three towns. The nationwide interventions were clustered in periods of several months, followed by intervention free periods also lasting several months. In total, we distinguished 13 nationwide intervention cycles (see Figure 3).

Figure 3: All 13 clusters scattered throughout the years



The number of interventions differs between clusters. We define the intensity of a cluster as the ratio between the number of interventions and the number of weeks. Cluster 8 has a relatively low intensity of 0.16, whereas cluster 7 has the highest intensity level of 0.55 (see Table 1). For an overview of all individual interventions, see appendix A.

Table 1: Description of the 13 clusters

	1	2	3	4	5	6	7	8	9	10	11	12	13	Average
Interventions	8	4	5	6	7	3	6	2	3	4	2	4	4	4.46
Weeks	22	15	15	21	18	14	11	13	16	10	5	10	12	14.00
Intensity	0.36	0.27	0.33	0.29	0.39	0.21	0.55	0.16	0.19	0.40	0.40	0.40	0.33	0.33

⁶ Annual figures on the number of debit card payments provided by Equens may differ from statistics provided by DPA, due to differences in reporting transaction data. However, the trends in card usage are similar.

We also included information by Statistics Netherlands on the level of consumer expenditure. By doing this, we could ensure that any influence of the economic crisis on consumer spending does not interfere with the effects of interventions.

Following Kosse (2013) we also collected information from the Royal Netherlands Meteorological Institute on the weather conditions in the Netherlands. We used this information to adjust for the influence of extreme weather conditions on consumers' shopping behaviour and their usage of debit cards.

5.2 Variables

Dependent variable

For the national campaign we focussed on the effect of the interventions on the weekly number of debit card transactions in the Netherlands, expressed by DC_t , with t denoting the number of weeks that have elapsed, starting from the first week in January 2005.⁷ For the regional interventions we focussed on their effects on the weekly number of debit card transactions in region (i) in week (t), expressed by DC_{it} .

Intervention variables

For the nationwide campaign, we distinguished several types of interventions (j), i.e. general interventions aimed at consumers, general interventions aimed at retailers, KBPM interventions focused on specific branches, KBPM interventions focused on large retail chains, UPTO interventions and PJG interventions. We also distinguished several clusters (k). Regional interventions are not clustered.

We distinguished between two types of impact: an impulse effect and a step effect. An impulse effect is a short-term effect of an intervention during the intervention period. It may be either positive or negative. After the intervention period, the number of debit card payments will return to its baseline level. We denote the impulse dummy of a nationwide intervention j in week t by $Impulse_{jt}$. It equals 1 if intervention j took place in week t and is equal to zero otherwise. For regional interventions the impulse dummy is denoted by $Impulse_{ijt}$ and equals 1 if intervention j took place in region i and in week t , and equals zero otherwise.

A step effect is a fixed long-term effect of a series of interventions in a specific cluster, which

⁷ An even better variable for assessing the impact of the public campaign and its interventions on debit card usage would have been the share of debit card payments in all POS-payments by Dutch consumers. Unfortunately, such information is not available as cash payments are not registered by banks or processed by ACHs, unlike card payments.

permanently shifts the baseline development of the weekly number of debit card payments up-or downwards. We denote the step dummy of the nationwide intervention cluster k in week t by $Step_{kt}$. This dummy equals 1 from the start of cluster k and zero otherwise. For regional interventions the step dummy for intervention j in region i is denoted by $Step_{ijt}$. This variable is only equal to 1 if intervention j took place in region i and week t is the week in which the intervention started or later. It is always zero for other regions or before the start of intervention j .

Table 2 presents an example of the value of the intervention indicators. The period lasts 10 weeks and includes two cycles with one intervention. The first intervention $j=1$ in cycle 1 is in weeks 3 and 4, and the second intervention $j=2$ of cycle 2 is in week 8. Figures 4.1 and 4.2 present graphical illustrations of these possible effects.

Table 2: Example intervention indicators for two cycles with one intervention each.

	Week 1	2	3	4	5	6	7	8	9	10
Impulse_{1t}	0	0	1	1	0	0	0	0	0	0
Step_{1t}	0	0	1	1	1	1	1	1	1	1
Impulse_{2t}	0	0	0	0	0	0	0	1	0	0
Step_{2t}	0	0	0	0	0	0	0	1	1	1

Figure 4.1: Example of an impulse dummy

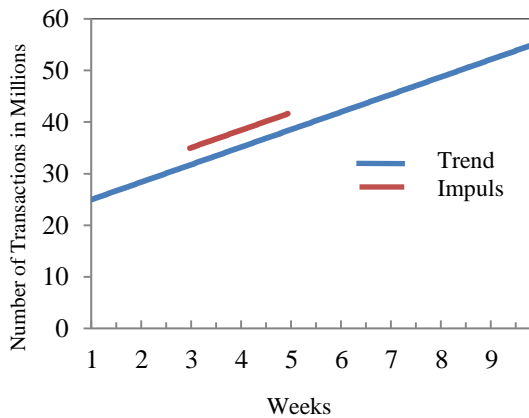
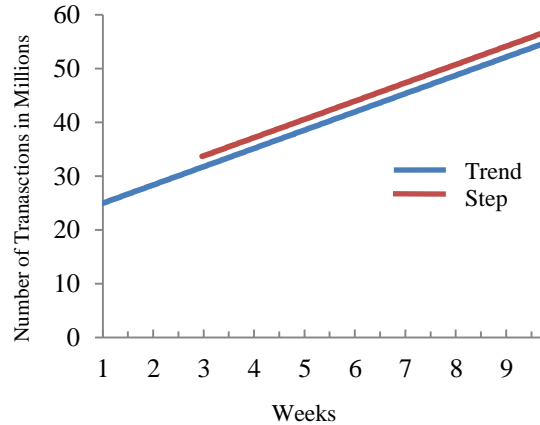


Figure 4.2: Example of a step dummy



Control variables

For the national study we included a dummy variable *Consumption_down*, which equals 1 if the nominal value of household consumption in a certain month went down compared to the same month the year before, and equals zero otherwise. This variable reflects the influence of the economic crisis in the Netherlands on debit card usage. As such a measure is unfortunately not available for the regional study, we constructed a dummy variable *Income_down* which equals 1 if the total value of the inhabitants' incomes in the region went down compared to the year before, and equals zero otherwise. We also included weather indicators as control variables, both for the national and regional analyses. These indicators are dummies equalling 1 in weeks with particularly cold, hot, stormy, or rainy

weather, i.e. weather conditions in which people may prefer to stay at home and postpone outdoor shopping. And last but not least, we also included variables reflecting seasonal and calendar effects. Previous research showed strong effects of these variables on consumers' usage of POS payment instruments (Esteves and Rodrigues, 2010, Jonker et al. 2012, Kosse, 2013). We have therefore taken into account possible calendar and holiday effects such as month of the year, week of the month as people usually receive their main income in one of the last two weeks of the month, school holidays⁸, public holidays or other special days.⁹

5.3 Econometric models

Figure 5 presents the trend of the weekly number of debit card payments in the Netherlands and in three towns with local interventions: Almere Stad, Leidschendam and Horst a/d Maas.

Figure 5: Number of debit card transactions

Figure 5.1: The Netherlands

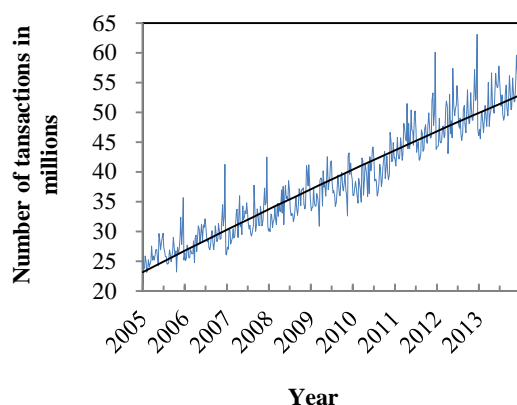


Figure 5.2: Almere Stad

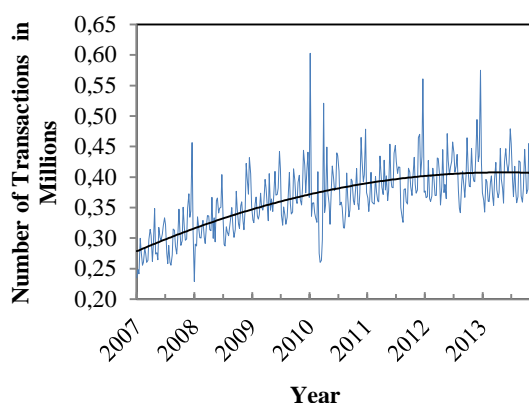


Figure 5.3: Leidschendam

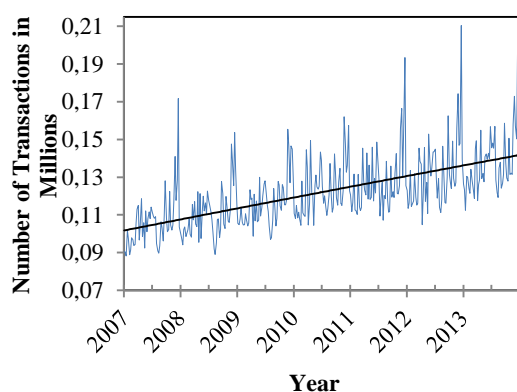
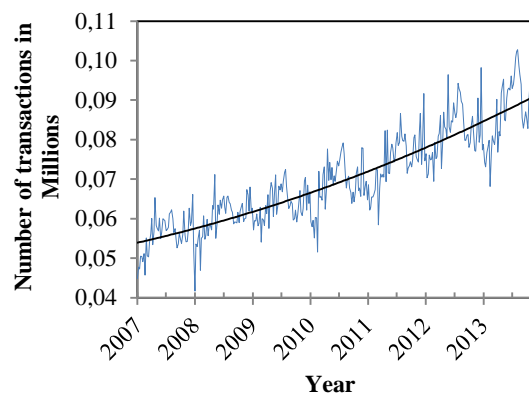


Figure 5.4: Horst a/d Maas



⁸ Christmas holidays, Spring holidays, May holidays, Summer holidays, Autumn holidays.

⁹ New Year's Day, Valentine's day (14 February), Koninginnedag (30 April), Sinterklaas (5 December), Christmas Day and Boxing Day, New Year's Eve, Easter, Whitsun, Ascension Day, Mother's Day, Father's Day.

The number of debit card payments in the Netherlands shows a definite positive trend with steady growth. In the towns where local interventions were made there clearly positive trends in debit card usage were also seen. Leidschendam shows a similar trend as the one observed at national level. Almere has a diminishing upward sloping trend whereas in Horst a/d Maas an increasing upward sloping trend was observed. A possible explanation may be that there are regional differences in the adoption and usage of debit cards by consumers. Adoption in Almere is relatively high at 2.8 weekly debit card payments per capita in 2007, compared to the Dutch average of 1.9, whereas debit card adoption in Horst a/d Maas is relatively low at 1.3 weekly debit card payments per capita.

We performed several statistical tests to examine whether the weekly number of debit card payments and consumption are trend stationary. For the national data we used the augmented Dickey Fuller (ADF) test and the Phillips-Perron (PP) Test (Table 3). Both tests reject the null hypothesis of a unit root in the weekly number of the debit card payments, when allowing for a time trend. This means that the number of debit card payments is generated by a trend stationary process, which can be estimated using OLS-regression.

Table 3: Results of unit root test for the weekly number of debit card payments.

	Augmented Dickey-Fuller	Phillips-Perron	Levin-Lin-Chiu
Netherlands	- 7.555***	-15.748***	-
Almere Stad	-	-	- 43.443***
Horst a/d Maas	-	-	- 43.590***
Leidschendam	-	-	-18.661***

*** 0.01 significance (1-tailed); ** 0.05 significance; * 0.10 significance.

Notes: Adjusted t-statistics of the tests are shown.

In order to get results that are straightforward to interpret we estimated log-linear models. Another advantage of using this model with the number of debit card payments as dependent variable is that it enables us to estimate both short-term and long-term effects of interventions on debit card usage. This would have been less straightforward if we had specified the dependent variable in first differences.

5.3.1 National analysis

We estimated the following time-series model in order to assess the influence of the public campaign on the weekly number of debit card payments in the Netherlands.

$$\begin{aligned}
\log(DC)_t = & \beta_0 + \beta_1 t + \beta_2 \text{Consumption_down}_t + \beta_3 \text{Hot}_t + \beta_4 \text{Cold}_t + \beta_5 \text{Rain}_t + \beta_6 \text{Storm}_t + \\
& \gamma_1 \text{January}_t + \dots + \gamma_{11} \text{November}_t + \gamma_{12} \text{FirstWeek/Month}_t + \dots + \gamma_{14} \text{Third Week/Month}_t + \\
& \delta_1 \text{Holiday}_{1t} + \dots + \delta_k \text{Holiday}_{kt} + \\
& \lambda_1 \text{Impulse}_{1t} + \dots + \lambda_n \text{Impulse}_{nt} + \xi_1 \text{Step}_{1t} + \dots + \xi_{13} \text{Step}_{13t} + \\
& \varphi_1 \log(DC)_{t-1} + \varepsilon_t
\end{aligned} \tag{1}$$

with week number $t = 1 \dots 469$

5.3.2 Regional analyses

We focused on the effect of local interventions in three towns that differ in size, income level and crime rate. Almere Stad is a large town, the average income of its inhabitants is below average and its crime rate is relatively high, Leidschendam is a medium-sized town, whose inhabitants earn above average incomes, whereas Horst a/d Maas is a small town in a rural area, whose inhabitants earn average incomes.

For each of these three towns we selected between five and 18 similar towns (see Appendix B) in order to compare the trend of debit card usage in the region where an intervention took place with the trend in similar regions. Subsequently, we used panel data to estimate the influence of the local intervention on debit card usage.¹⁰ For Almere Stad and Horst a/d Maas we also estimated the spillover effects of the interventions on consumers' card usage in nearby towns.

For the regional data, we used the Levin-Lin-Chu test, which is a unit root test for panel data (Verbeek, 2012). As for the national data this test shows that for each of the three towns the null hypothesis of a unit root is rejected and that the data are generated by a trend stationary process. We used a Hausman test in order to examine whether we should use a fixed-effects or a random-effects model. The test results showed that the residuals did not correlate with the explanatory variables. Consequently, we should use the random effects model, which assumes that the coefficients of the explanatory variables do not vary over time.

We ran the following random effects model in order to assess the influence of the nationwide campaign and the three local interventions in Almere on debit card usage in Almere-Stad (town with local interventions), Almere (spill-over) and 18 similar towns. For Leidschendam and Horst a/d Maas we estimated similar models.

¹⁰ For the regional analyses we examined the period between January 2007 and December 2013, as information on debit card usage by postal code was only available from 2007 onwards.

$$\begin{aligned}
\log(DC)_{it} = & \beta_0 + \beta_1 t + \beta_2 \text{Income_down}_{it} + \beta_3 \text{Hot}_{it} + \beta_4 \text{Cold}_{it} + \beta_5 \text{Rain}_{it} + \beta_6 \text{Storm}_{it} + \\
& \gamma_1 \text{January}_t + \dots + \gamma_{11} \text{November}_t + \gamma_{12} \text{FirstWeek/Month}_t + \dots + \gamma_{14} \text{Third Week/Month}_t + \\
& \delta_1 \text{Holiday}_{1t} + \dots + \delta_k \text{Holiday}_{kt} + \\
& \lambda_1 \text{Impulse}_{1t} + \dots + \lambda_n \text{Impulse}_{nt} + \\
& \psi_1 \text{Impulse_Almere_1}_t + \psi_2 \text{Impulse_Almere_2}_t + \psi_3 \text{Impulse_Almere_3}_t + \\
& \psi_4 \text{Impulse_Almere Stad_1}_t + \psi_5 \text{Impulse_Almere Stad_2}_t + \psi_6 \text{Impulse_Almere} \\
& \text{Stad_3}_t + \psi_7 \text{Impulse_Rest}_{it} + \\
& \omega_1 \text{Step_Almere_1}_t + \omega_2 \text{Step_Almere_2}_t + \omega_3 \text{Step_Almere_3}_t + \\
& \omega_4 \text{Step_Almere Stad_1}_t + \omega_5 \text{Step_Almere Stad_2}_t + \omega_6 \text{Step_Almere Stad_3}_t + \\
& \omega_7 \text{Step_Rest}_{it} + \varepsilon_{it}
\end{aligned} \tag{2}$$

with week number $t = 1 \dots 359$, and town $i = 1, \dots 20$.

We estimated two versions of the random effects model: one including only the short-term effects of the national interventions and one also including the long-term cluster effects.

6. ESTIMATION RESULTS

6.1 Results national campaign

Table 4 shows the estimation results for the Netherlands.¹¹ The only type of intervention with a significant short-term impact on debit card usage was the one made in the KBPM campaign focused on large-scale retailers (*KBPM_GWB*). In order to assess whether the impact of this type of intervention changed over time, we estimated its impact for each year separately. These estimations show that in 2007, during weeks with these kinds of interventions the number of debit card transactions was 4.3% higher on average than in weeks without such interventions. The negative result for the year 2010 suggests that while the interventions had a positive effect on the number of debit card transactions at the early stages of the campaign, near the end of its lifecycle this type of intervention had lost its impact on consumer behaviour.

¹¹ The estimation results are fairly robust to different specifications of the model. The differences between the short-term and the total model reveal that short-term effects of interventions, the organic trend, calendar and holiday effects are robust to inclusion of the long-term cluster variables. We also estimated the models with different time horizons, 2005 – 2007, 2005 – 2008, 2005 – 2009, etc. The estimated short run and long-term campaign effects were not affected by these different observation periods.

Table 4: Estimation results for debit card usage in the Netherlands, 2005 – 2013

Variable	Calendar Model	Holiday Model	Short-term Model	Total Model
C	17.118***	16.990***	16.987***	16.978***
Trend	0.002***	0.002***	0.002***	0.002***
Consumption down		-0.011**	-0.013**	-0.013**
Storm		-0.034**	-0.036***	-0.025
Consumers			-0.006	-0.014
Retailers			0.017	0.013
KBPM_Branches			-0.000	-0.000
KBPM_GWB_2007			0.046**	0.043*
KBPM_GWB_2008			0.014	0.010
KBPM_GWB_2009			0.019**	0.015
KBPM_GWB_2010			-0.050***	-0.056***
UPTO			0.002	-0.000
PJG			-0.017	-0.001
1 st Cluster				0.006
2 nd Cluster				-0.016
3 rd Cluster				0.025***
4 th Cluster				-0.019
5 th Cluster				-0.015
6 th Cluster				-0.029*
7 th Cluster				0.052***
8 th Cluster				-0.001
9 th Cluster				0.010
10 th Cluster				-0.024**
11 th Cluster				-0.016
12 th Cluster				-0.004
13 th Cluster				-0.010
Transactions _{t-1}	0.073	0.233***	0.242***	0.102**
No. of Observations	466	466	466	466
R ²	0.942	0.972	0.972	0.975

*** 0.01 significance (2-tailed); ** 0.05 significance; * 0.10 significance. The full model includes calendar and holiday effects and can be found in appendix C.

The fixed long-term effects of a series of interventions in a specific period are presented by the different *Cluster* variables. The coefficients for clusters 3 and 7 are positive and significant. Cluster 3 led to 2.5% more debit card payments, and cluster 7 to 5.2% more debit card payments. These clusters include *KBPM_GWB* interventions in the retail chains of the *Blokker* holding and the *Ahold* holding. The former consists of a large number of household appliances shops where many small transactions are made; the latter is the holding company of *Albert Heijn* supermarkets, the largest supermarket chain in the Netherlands. In paragraph 5.1 we established that the 7th cluster had the highest level of intensity. This result suggests that a long-term effect of a series of interventions during a specific period will be more robust if many different interventions are made within a relatively short amount of time. While this holds true for cluster 7, cluster 3 displays an average intensity level and is nonetheless significant. One explanation may be the participation of the *Albert Heijn* supermarket chain in this cluster. Negative coefficients for clusters 6 and 10 were observed, which are less straightforward to explain than the positive effects of clusters 7 and 10. It is unlikely that the interventions made in cluster 6 and cluster 10 discouraged consumers from using their debit cards. A

possible explanation is that the effects of these clusters actually reveal the dampening of the positive long-term effects of cluster 3 and the partial dampening of the long-term effect of cluster 7. In conclusion, we observed that the initial short-run increase in debit card usage evolved into a longer lasting effect for the earlier years in the sample with the interventions focused on large retail chains being its most prominent driver.

Regarding our first research question, we concluded that the interventions have had a positive impact on debit card usage. Both short- and long-term effects occurred for interventions focused on large-scale retailers. Considering our second research question, we found no evidence that the introduction of new campaign slogans contributed to increased debit card usage.

With respect to the other explanatory variables, we found a positive trend indicating organic growth of 9% in the number of debit card payments per year. This reflects changing payment habits independent of the campaign. When looking at the dummy *Consumption_down* we found that a decline in national consumption results in a decline in the number of debit card payments of 1.3%, corresponding with 47 million fewer debit card payments between 2007 and 2013. This effect reflects the influence of the economic crisis on debit card usage.

6.2 Results regional campaigns

Table 5 shows the results for the panel data models for Almere Stad, Leidschendam and Horst a/d Maas. The results of the models including only short-term effects of the nationwide campaign show a positive short-term effect of the local intervention made in Leidschendam (+3.4%), but not in the other two towns. We found positive and significant long-term effects of the intervention made in Horst a/d Maas and the first intervention in Almere Stad. Similar to the long-term effects of the clusters in the national model, the negative effects of the second and third intervention in Almere Stad can be explained by a dampening of the effects of the first intervention. In addition, after the first period of local interventions, the shopping centre became an area where debit cards were accepted by 100% of the stores. This leaves no room for additional growth in debit card usage as a result of improved card acceptance in this specific shopping centre. By contrast, the long-term effect for Leidschendam was not as expected: negative and significant. Results on spill-over effects are inconclusive.

As for the nationwide interventions made, we found positive and significant effects of the retail interventions as well as the ones focused on large retail chains. Additionally, consumer interventions display positive effects in two out of three models. However, the effects of interventions focused on specific sectors are negative and significant in two models and PJG interventions in one model. Results on UPTO interventions are inconclusive.

Table 5: Panel data results debit card usage, regional interventions, 2007 – 2013

Variable	Almere	Almere including clusters	Leidschendam	Leidschendam including clusters	Horst a/d Maas	Horst a/d Maas including clusters
C	12.442***	12.438***	11.775***	11.759***	10.827***	10.831***
Trend	0.001***	0.001***	0.001***	0.001***	0.001***	0.000
Income_down	-0.064***	-0.033**	-0.023**	-0.038***	0.011**	-0.002
Cold			-0.038**	-0.044**		
Consumer	0.011**	0.007	-0.001	-0.004	0.011**	0.018***
Merchant	0.049***	0.044***	0.025***	0.019**	0.019***	0.025***
KBPM_Branches	-0.023***	-0.024***	-0.005	-0.005	-0.014***	-0.026***
KBPM_GWB	0.050***	0.018***	0.028***	0.015**	0.024***	0.010**
UPTO	0.012**	0.007	-0.011	-0.003	-0.011**	-0.019***
PJG	0.011	0.006	0.015	0.004	-0.031***	-0.012
Impulse_Almere_1	0.018	0.080*				
Impulse_Almere_2	0.002	0.070				
Impulse_Almere_3	0.016	-0.006				
Step_Almere_1	0.096***	-0.025				
Step_Almere_2	-0.030*	0.010				
Step_Almere_3	-0.055***	-0.065***				
Impulse_Spillover_Almere_1	-0.272***	-0.211***				
Impulse_Spillover_Almere_2	0.023	0.091*				
Impulse_Spillover_Almere_3	-0.014	-0.035				
Step_Spillover_Almere_1	0.115***	-0.006				
Step_Spillover_Almere_2	-0.000	0.040**				
Step_Spillover_Almere_3	-0.001	-0.011				
Impulse_Control_Almere	0.060***	0.071***				
Step_Control_Almere	-0.003	0.090***				
Impulse_Leidschendam			0.034**	-0.010		
Step_Leidschendam			-0.037***	0.001		
Impulse_Control_L'dam			0.039***	-0.004		
Step_Control_L'dam			-0.085***	-0.046***		
Impulse_Horst					-0.009	-0.010
Step_Horst					0.051***	0.133***
Impulse_Spillover_Horst					0.018	0.026
Step_Spillover_Horst					-0.082***	-0.003
Impulse_Control_Horst					-0.063***	-0.081***
Step_Control_Horst					0.036***	0.045***
1 st Cluster		-0.000		0.007		0.034***
2 nd Cluster		0.011		0.024**		0.030***
3 rd Cluster		0.024**		0.014		0.031***
4 th Cluster		0.101***		-0.014		0.056***
5 th Cluster		-0.036***		-0.005		0.038***
6 th Cluster		-0.073***		-0.029**		-0.066***
7 th Cluster		0.014		-0.025**		0.018**
8 th Cluster		-0.011		-0.011		-0.005
9 th Cluster		0.023**		0.002		0.073***
10 th Cluster		-0.013*		-0.009		0.007
11 th Cluster		-0.006		-0.013		0.017**
12 th Cluster		-0.006		0.007		0.034***
13 th Cluster		-0.001		-0.021		0.001
No. of Observations	359	359	359	359	359	359
R ² (within)	0.640	0.664	0.765	0.780	0.733	0.745

*** 0.01 significance (2-tailed); ** 0.05 significance; * 0.10 significance. The full model includes calendar and holiday effects, which and can be found in Annex D.

Regarding the other explanatory variables, the organic trend is positive and significant in all three sets of municipalities. In two out of three sets, we found a negative effect of a fall in income on debit card usage at town level. With respect to weather conditions, in Leidschendam and surrounding areas extreme cold depressed the number of debit card payments made.

The models including clusters show similar effects to the models excluding clusters for national interventions as well as for the organic trend, income falls and weather conditions. However, the regional interventions showed different effects.

Here, we found a positive short-term effect of the first intervention in Almere Stad, but no short-term effects in Leidschendam and Horst a/d Maas. As for long-term effects, we no longer found a positive effect in Almere Stad, nor did we find negative long-term effects of the second intervention in Almere Stad, or of the intervention in Leidschendam. We did still find a positive effect of the intervention in Horst a/d Maas and a negative effect of the third intervention in Almere Stad.

For the nationwide clusters, we found positive overall effects in two out of three sets (Almere Stad and Horst a/d Maas), but for Leidschendam and similar regions the overall effect is negative. The difference in results between the two types of models may be due to the fact that national and regional interventions were often made at the same time, which makes it impossible to disentangle the effects of regional interventions from those of nationwide interventions.

6.3 Social cost implications of the public campaign

The way consumers pay at shop counters influences the overall costs of the payment system incurred by banks, retailers, the central bank (DNB) and ACH Equens. On average, debit card payments in the Netherlands are less expensive to society than cash payments, especially for high amounts (Jonker, 2013). We showed that some of the interventions of a nationwide public campaign influenced consumers' payment behaviour. There are short and long-term effects, both positive and negative. These results indicate that the public campaign influenced the social costs of the payment system.

To gauge just how much, we distilled the change in the number of debit card payments at the expense of cash payments per significant intervention and we estimated their impact on social costs. Following Brits and Winder (2005) we focussed on variable costs in our projection for cost savings (see Table 6). We distinguished between costs varying with the number of transactions and costs varying with their value. The former are relevant for both the social costs associated with cash and card payments, the latter only for cash payments. Using information obtained from Currence (2010) on debit card usage growth by transaction range, we estimated the average transaction amount of a substituted cash-for-debit card payment in 2009, which was EUR 21. We assumed that this transaction amount also held

for the substitution achieved by the public campaign. The difference in variable costs between a EUR 21 cash and a EUR 21 debit card payment was EUR 0.16 in 2009 (Jonker, 2013). For the sake of simplicity, we assumed that the amount of EUR 21 and the associated cost savings applied for the entire period.

The public campaign led to a net substitution of 352 million debit card payments between 2007 and 2013. The associated cost savings for society add up to approximately EUR 56 million. Cluster 7 in 2010 had the largest impact on consumer payment behaviour, leading to 427 million additional debit card payments and EUR 68 million in cost savings.

Table 6: Impact of public campaign on debit card usage and social costs, 2007 – 2013

Intervention	Change in the number of debit card payments (%)	Absolute change in number of debit card payments (millions)	Social cost savings (EUR million)
<i>Short-term effects</i>			
KBPM_GWB_2007	4.3%	6	1
KBPM_GWB_2010	-5.6%	-4	-1
<i>Lon-term effects</i>			
Cluster 3	2.5%	308	49
Cluster 6	-2.9%	-273	-44
Cluster 7	5.2%	427	68
Cluster 10	-2.4%	-112	-18
Total 2007 - 2013	2.0%	352	56

The total sum of cost savings of EUR 56 million, corresponds with annual cost savings of EUR 8 million on average. The total costs of the campaign cost came to EUR 11 million. Consequently, the return on investment (ROI) is about 500%. Annual cost savings are rather modest relative to the social costs of cash and debit card payments in 2009, which amounted to EUR 2.4 billion. The level of savings is comparable with immediate cost savings of EUR 5 million associated with ending the debit card surcharge on small amount debit card payments in the Netherlands (Bolt et al, 2010). However, the level of the savings is relatively large relative to the (opposite) effect of media attention related to card fraud. Kosse (2012) revealed that between 2005 and 2009 such media attention led to a net substitution of 13 million debit card payments by cash payments, corresponding with a social cost increase of EUR 5 million during the four-year period.

7. SUMMARY AND CONCLUDING REMARKS

The results of our research show positive effects of a public campaign on consumers' debit card usage, both in the short and in the long term. The campaign has contributed to the substitution of cash by debit card payments, thereby lowering the social costs of retail payments. These cost savings are, however, modest, due to the relatively small absolute change in the number of debit card payments.

The effects of the campaign are strongest at the early stages, while after a few years the effectiveness has worn off. This is in line with results of earlier research on marketing effectiveness. The most effective interventions used the behaviour expansion strategy, encouraging consumers to use their debit cards not only for higher value purchases, but also for low value purchases (*Klein bedrag? Pinnen mag!*). The introduction of new slogans was not successful in countering the declining effectiveness during the run of the campaign. It may be the case that those consumers who were open to changing their payment behaviour, and whose main reason not to pay by debit card was the perception that certain retailers preferred cash, were already reached at the early stages of the campaign. For those who were not moved to change their behaviour by the campaign in the early years, later interventions were perhaps unlikely to have made a difference. It should also be noted that the later slogans no longer focused on behaviour expansion, but rather on following behaviour of others ("Why not use your debit card?" *U pint toch ook?*- UPTO) or adapting to the preferences of retailers ("Debit card? Yes, Please" *Pinnen? Ja, graag!* (PJG) . These strategy changes may also have influenced the effectiveness of the later interventions. Looking at campaign characteristics, there is some indication that increasing intensity had a positive impact, as did a focus on certain large retail chains.

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Annex A: Overview of all interventions

2007

KBPM - large retail chains (GWB)

Tag-on¹ AH

Logo tag-on Aldi/Intratuin/Action

Start KBPM: intervention with Estelle Gullit

Retailer

Payment information brochure

Consumer

KBPM - advertisements

KBPM - promotion teams

New PIN POS available

www.sintpint.nl

www.pinjekerst.nl

2008

KBPM - Branches

Supermarket

KBPM - GWB

Tag-on AH

Tag-on McDonalds

Tag-on C1000

Tag-on Primera/Kruitvat/Blokker

Retailers

SME mailing: win your own commercial

KBPM - radio campaign

Payment information brochure

Local intervention

Almere Stad

2009

KBPM - Branches

Supermarkets

Drugstores

Liquor stores

DIY stores

KBPM - GWB

Tag-on Bart Smit, Coop, Marskramer

V&D tag-on

Jumbo tag-on

Tag-on Hema, Xenox, Zeeman

AH tag-on

Local interventions

Almere Stad

Winkelcentrum Leidsenhage

Horst a/d Maas

Consumers

PIN and WIN Winterparty

Retailers

Payment information brochure

2010

KBPM - Branches

Liquor stores

Supermarkets

Fashion

KBPM - GWB

Blokker

Consumers

Debit card week

Debit card user of the day

2011

KBPM - Branches

Garden centres and DIY stores

Petrol

Horeca

UPTO

Debit card champions

2012

UPTO

Food

Petrol and tobacco

Catering industry

Supermarkets

All branches

2013

PJG

Commercials

RTL4 "Did you know?"

PJG - Branches

Primera/ Telegraaf

Peijnenburg/ Dirk van den Broek

Facebook

Supermarkets

Retailers

Payment information brochure

Annex B: Overview towns used in regional analyses

Regional intervention 1: urbanised area, below average income, above average crime rate

Name city	Type of city	Avg. income '07 (* EUR 1,000)	Number of inhabitants '07 (* 1,000)	Theft '07 (per 1,000 inhabitants)
Almere Stad	Regional intervention	21.4	77	45.1
Almere gemeente	Spill-over	21.4	105	45.1
Amersfoort	Control	23.2	140	55.3
Apeldoorn	Control	21.9	155	48.9
Delft	Control	21.4	96	49.2
Deventer	Control	20.5	97	43.2
Dordrecht	Control	20.8	118	37.6
Enschede	Control	19.0	155	52.5
Haarlem	Control	22.0	147	43.5
Helmond	Control	20.4	86	42.9
Hilversum	Control	23.6	84	49.6
Leiden	Control	22.3	117	50.1
Lelystad	Control	20.7	73	42.3
Roosendaal	Control	21.0	77	53.5
Schiedam	Control	20.1	75	43.7
Sittard-Geleen	Control	20.6	96	56.2
Spijkensisse	Control	21.4	73	40.8
Venlo	Control	20.0	92	46.4
Zoetermeer	Control	23.0	119	45.4
Zwolle	Control	21.1	116	43.9

Regional intervention 2: Urbanised area, above average income

Name of town	Type of town	Avg. income '07 (* EUR 1,000)	Number of inhabitants '07 (* 1,000)	Number of inhabitants/sq. km
Leidschendam	Regional intervention	26.7	72	2214
Leiderdorp	Control	27.1	27	2313
Amstelveen	Control	28.2	83	2011
Hilversum	Control	25.8	86	1875
Barendrecht	Control	27.3	47	2373
Ridderkerk	Control	24.3	45	1904

Regional intervention 3: Villages with above average income

Name city	Type of city	Avg. income '07 (* EUR 1,000)	Number of inhabitants '07 (* 1,000)	Number of inhabitants/ sq. km
Horst a/d Maas	Regional intervention	23.8	42	222
Venray	Spill-over	23.7	43	263
Berkelland	Control	22.9	45	174
Deurne	Control	23.6	32	271
Epe	Control	24.3	33	208
Hellendoorn	Control	23.0	36	259
Hof van Twente	Control	24.3	36	167
Leudal	Control	24.1	36	224
Moerdijk	Control	25.0	37	229
Noordenveld	Control	24.2	31	154
Oldambt	Control	20.6	39	172
Oude IJsselstreek	Control	22.1	40	292
Peel en Maas	Control	23.5	43	271
Raalte	Control	23.5	37	214
Stadskanaal	Control	20.4	33	280
Steenwijkerland	Control	22.4	43	150
Tynaarlo	Control	25.8	32	225
Tytsjerksteradiel	Control	23.0	32	215

Annex C: Full estimation results of national campaign

Variable	Calendar Model	Holiday Model	Short-term Model	Total Model
C	17.118***	16.990***	16.987***	16.976***
Trend	0.002***	0.002***	0.002***	0.002***
January	-0.084***	0.051***	0.052***	0.050***
February	-0.082***	0.057***	0.059***	0.061***
March	-0.055***	0.080***	0.079***	0.086***
April	-0.003***	0.104***	0.105***	0.113***
May	-0.012	0.138***	0.140***	0.148***
June	0.016	0.158***	0.158***	0.169***
July	-0.057***	0.140***	0.141***	0.152***
August	-0.076***	0.145***	0.146***	0.158***
September	-0.057***	0.090***	0.092***	0.097***
October	-0.046***	0.086***	0.086***	0.087***
November	-0.022	0.090***	0.094***	0.095***
1 st Week of the month	-0.045***	-0.056***	-0.057***	-0.056***
2 nd Week of the month	-0.065***	-0.065***	-0.065***	-0.064***
3 rd Week of the month	-0.015***	-0.038***	-0.038***	-0.036***
Week 48		0.084***	0.082***	0.088***
Week 49		0.143***	0.143***	0.147***
Week 50		0.163***	0.163***	0.166***
Week 51		0.265***	0.262***	0.261***
Consumption_down		-0.011**	-0.014***	-0.013***
Easter _{t-1}		-0.041**	-0.039**	-0.039**
Easter		0.054***	0.054***	0.057***
Mother's day _{t-1}		-0.051***	-0.052***	-0.053***
Koninginnedag		-0.088***	-0.088***	-0.087***
Whitsun _{t-1}		-0.065***	-0.063***	-0.063***
Whitsun _{t+1}		-0.030***	-0.031***	-0.032***
Ascension day _{t-1}		0.043***	0.041***	0.040***
New Year's Eve _{t+1}		0.050	0.055*	0.055
Summer_Region1 _{t-1}		-0.032***	-0.032***	-0.034***
Summer_Region1		-0.023***	-0.024***	-0.023***
Summer_Region2 _{t-1}		-0.024**	-0.023**	-0.028***
May_Holiday		0.033***	0.032***	0.032***
May_Holiday _{t+1}		0.071***	0.071***	0.071***
Autumn_Region2		0.025**	0.030**	0.028**
Storm		-0.034**	-0.036***	-0.025
Consumers			-0.006	-0.014
Retailers			0.017	0.013
KBPM_Branches			-0.001	-0.000
KBPM_GWB_2007			0.046**	0.043*
KBPM_GWB_2008			0.014	0.010
KBPM_GWB_2009			0.019**	0.015
KBPM_GWB_2010			-0.050***	-0.056***
UPTO			0.002	-0.006
PJG			-0.017	-0.001
1 st Cluster				0.006
2 nd Cluster				-0.016
3 rd Cluster				0.025***
4 th Cluster				-0.019
5 th Cluster				-0.015
6 th Cluster				-0.029*
7 th Cluster				0.052***
8 th Cluster				-0.001
9 th Cluster				0.010
10 th Cluster				-0.024**
11 th Cluster				-0.016
12 th Cluster				-0.004
13 th Cluster				-0.010
Transactions _{t-1}		0.233***	0.242***	0.102**
No. of Observations	466	466	466	466
R ²	0.942	0.972	0.972	0.975

*** 0.01 significance (2-tailed); ** 0.05 significance; * 0.10 significance.

Annex D: Results of regional campaigns

Almere stad

Variable	Calendar Model	Holiday Model	National Model	Total Model	Model including clusters
C	12.446***	12.480***	12.454***	12.442***	12.438***
Trend	0.001***	0.001***	0.001***	0.001***	0.001***
January	-0.059***	-0.080***	-0.058***	-0.054***	-0.063***
February	-0.064***	0.138***	0.180***	0.194***	0.195***
March	-0.047***	-0.039**	-0.020	-0.012	-0.025
April	-0.029***	-0.054***	-0.034**	-0.026	-0.031*
May	-0.014**	-0.015	-0.004	0.005	0.002
June	0.025***	0.010	0.027*	0.036**	0.023
July	-0.070***	0.003	0.022	0.029*	0.018
August	-0.082***	0.016	0.039**	0.042**	0.032*
September	-0.026***	-0.031*	-0.003	-0.002	-0.019
October	-0.013**	-0.027*	-0.018	-0.012	-0.022
November	0.022***	0.007	0.026*	0.034**	0.014
1 st Week of the month	-0.049***	-0.069***	-0.071***	-0.071***	-0.070***
2 nd Week of the month	-0.066***	-0.083***	-0.084***	-0.084***	-0.082***
3 rd Week of the month	-0.007*	-0.037***	-0.041***	-0.040***	-0.038***
December effect		0.045***	0.047***	0.046***	0.043***
December effect _{t-1}		0.049***	0.059***	0.059***	0.055***
December effect _{t-2}		0.130***	0.144***	0.144***	0.138***
December effect _{t-3}		-0.028*	-0.006	-0.007	-0.017
December effect _{t-4}		-0.123***	-0.118***	-0.117***	-0.122***
Easter _{t-1}		-0.039***	-0.034***	-0.034***	-0.040***
Easter		0.093***	0.093***	0.092***	0.089***
Mother's day _t		0.043***	0.063***	0.062***	0.057***
Mother's day _{t+1}		-0.031**	-0.031**	-0.031**	-0.030**
Father's day		0.018*	0.016*	0.016*	0.021**
Koninginnedag _{t+1}		0.081***	0.080***	0.080***	0.078***
Whitsun		-0.040***	-0.040***	-0.040***	-0.047***
Ascension day _{t-1}		0.075***	0.092***	0.092***	0.090***
Ascension day		-0.051***	-0.038	-0.038***	0.047***
Valentine's day _{t-1}		-0.121***	-0.113***	-0.117***	-0.123***
Valentine's day		-0.130***	-0.137***	-0.147***	-0.150***
Valentine's day _{t+1}		-0.214***	-0.229***	-0.243***	-0.245***
New Year's Eve _{t-1}		0.147***	0.147***	0.149***	0.152***
New Year's Eve		-0.227***	-0.215***	-0.208***	-0.208***
Summer_Region1 _{t-1}		-0.035***	-0.033***	-0.029***	-0.034***
Summer_Region1		-0.021***	-0.030***	-0.029***	-0.026***
Summer_Region2 _{t-1}		-0.032***	-0.024***	-0.020***	-0.025***
Summer_Region2		-0.023***	-0.028***	-0.027***	-0.026***
Summer_Region3 _{t-1}		-0.040***	-0.032***	-0.038***	-0.038***
May_Holiday _{t-1}		-0.046***	-0.052***	-0.052***	-0.056***
May_Holiday		-0.038***	-0.046***	-0.046***	-0.046***
Autumn_Region1		0.018*	0.016*	0.014	0.011
Autumn_Region3 _{t+1}		-0.016*	-0.016*	-0.020*	-0.020**
Spring_Region1 _{t-1}		-0.054***	-0.056***	-0.055***	-0.046***
Spring_Region1 _{t+1}		-0.031*	-0.031*	-0.031**	-0.031**
Spring_Region2 _{t-1}		-0.015***	-0.163***	-0.170***	-0.168***
Spring_Region2		-0.082***	-0.107***	-0.119***	-0.115***
Spring_Region2 _{t+1}		-0.054***	-0.066***	-0.072***	-0.070***
Spring_Region3 _{t-1}		-0.101***	-0.116***	-0.114***	-0.120***
Spring_Region3 _{t+1}		-0.035***	-0.035***	-0.035***	-0.035**
Income_down		-0.074***	-0.068***	-0.064***	-0.033**
Consumers			0.008	0.011**	0.007
Retailers			0.048***	0.049***	-0.044***
KBPM_Branches			-0.024***	-0.023***	-0.024***
KBPM_GWB			0.055***	0.050***	0.018***
UPTO			0.010*	0.012**	0.007
PJG			0.004	0.011	0.006
Impulse_Almere_1				0.018	0.080*
Impulse_Almere_2				0.002	0.070

Impulse_Almere_3				0.016	-0.006
Step_Almere_1				0.096***	-0.025
Step_Almere_2				-0.030*	0.010
Step_Almere_3				-0.055***	-0.065***
Impulse_Spillover_Almere_1				-0.272***	-0.211***
Impulse_Spillover_Almere_2				0.023	0.091*
Impulse_Spillover_Almere_3				-0.014	-0.035
Step_Spillover_Almere_1				0.115***	-0.006
Step_Spillover_Almere_2				-0.000	0.040**
Step_Spillover_Almere_3				-0.001	-0.011
Impulse_Control_Almere				0.060***	0.071***
Step_Control_Almere				-0.003	0.090***
1 st Cluster					-0.000
2 nd Cluster					0.011
3 rd Cluster					0.024**
4 th Cluster					0.101***
5 th Cluster					-0.036***
6 th Cluster					-0.073***
7 th Cluster					0.014
8 th Cluster					-0.011
9 th Cluster					0.023**
10 th Cluster					-0.013*
11 th Cluster					-0.006
12 th Cluster					-0.006
13 th Cluster					-0.001
No. of Observations	365	359	359	359	359
R ² (within)	0.000	0.612	0.625	0.640	0.664

*** 0.01 significance (2-tailed); ** 0.05 significance; * 0.10 significance.

Leidschendam

Variable	Calendar Model	Holiday Model	National Model	Total Model	Model including clusters
C	11.847***	11.823***	11.806***	11.775***	11.759***
Trend	0.001***	0.001***	0.001***	0.001***	0.001***
January	-0.134***	-0.091***	-0.077***	-0.060***	-0.070***
February	-0.121***	-0.115***	-0.105***	-0.088***	-0.094***
March	-0.087***	-0.056***	-0.048**	-0.030	-0.039**
April	-0.099***	-0.057***	-0.047**	-0.024	-0.033
May	-0.089***	-0.026	-0.018	0.005	-0.008
June	-0.043***	-0.011	-0.003	0.014	0.001
July	-0.135***	-0.016	-0.013	0.003	-0.003
August	-0.161***	0.049	0.016	0.033	0.016
September	-0.098***	-0.049**	-0.034*	-0.021	-0.038**
October	-0.086***	-0.047**	-0.045**	-0.026	-0.033*
November	-0.034***	0.001	0.013	0.030*	0.020
1 st Week of the month	-0.049***	-0.064***	-0.064***	-0.064***	-0.064***
2 nd Week of the month	-0.069***	-0.079***	-0.079***	-0.080***	-0.080***
3 rd Week of the month	-0.010*	-0.030***	-0.032***	-0.032***	-0.032***
December effect		0.062***	0.063***	0.074***	0.070***
December effect _{t-1}		0.069**	0.076***	0.096***	0.087***
December effect _{t-2}		0.165***	0.172***	0.190***	0.182***
December effect _{t-3}		-0.089***	-0.083***	-0.074***	-0.075***
Easter _{t-1}		-0.058***	-0.051***	-0.053***	-0.058***
Easter		0.046***	0.049***	0.048***	0.045***
Easter _{t+1}		0.033***	0.034***	0.032***	0.035***
Mother's day _{t-1}		-0.035***	-0.037***	-0.038***	-0.036***
Father's day		0.024**	0.021*	0.028**	0.027**
Koninginnedag		-0.081***	-0.083***	-0.084***	-0.085***
Koninginnedag _{t+1}		0.074***	0.075***	0.073***	0.071***
Whitsun _{t-1}		-0.043***	-0.037***	-0.038***	-0.042***
Whitsun _{t+1}		-0.069***	-0.066***	-0.069***	-0.069***
Ascension day _{t-1}		0.036***	0.039***	0.035***	0.036***
Valentine's day _{t-1}		-0.029*	-0.017	-0.019	-0.021
Valentine's day		0.051***	0.056***	0.057***	0.056***
Valentine's day _{t+1}		0.042**	0.047***	0.045***	0.045***
New Year's Eve _{t-1}		0.031**	0.031**	0.031**	0.024*
New Year's Eve		-0.107***	-0.095***	-0.078***	-0.095***
New Year's Eve _{t+1}		0.069***	0.079***	0.087***	0.072***

Summer_Region1 _{t-1}		-0.053***	-0.056***	-0.055***	-0.053***
Summer_Region2 _{t-1}		-0.046***	-0.044***	-0.049***	-0.047***
Summer_Region2		-0.043***	-0.044***	-0.043***	-0.044***
Summer_Region3 _{t-1}		-0.036***	-0.032***	-0.032***	-0.033***
Summer_Region3 _{t+1}		0.020**	0.025***	0.026***	0.022***
Spring_Region2		0.040**	0.029*	0.032**	0.034**
Spring_Region3		0.037**	0.040***	0.039***	0.039***
Income_down		-0.055***	-0.053***	-0.023**	-0.038***
Cold weather		-0.041**	-0.045**	-0.038**	-0.044***
Consumers			-0.002	-0.001	-0.004
Retailers			0.032***	0.025***	0.019**
KBPM_Branches			-0.008*	-0.005	-0.005
KBPM_GWB			0.044***	0.028***	0.015**
UPTO			-0.011	-0.011	-0.003
PJG			0.007	-0.015	0.004
Impulse_Leidschendam				0.034**	-0.010
Step_Leidschendam_Longterm				-0.037***	0.001
Impulse_Control_L'dam				0.039***	-0.004
Step_Control_L'dam				-0.085***	-0.046***
1 st Cluster					0.007
2 nd Cluster					0.024**
3 rd Cluster					0.014
4 th Cluster					-0.014
5 th Cluster					-0.005
6 th Cluster					-0.029**
7 th Cluster					-0.025**
8 th Cluster					-0.011
9 th Cluster					0.002
10 th Cluster					-0.009
11 th Cluster					-0.013
12 th Cluster					0.007
13 th Cluster					-0.021
No. of Observations	365	359	359	359	359
R ² (within)	0.000	0.735	0.745	0.765	0.780

*** 0.01 significance (2-tailed); ** 0.05 significance; * 0.10 significance.

Horst a/d Maas

Variable	Calendar Model	Holiday Model	National Model	Total Model	Model including clusters
C	10.938***	10.856***	10.835***	10.827***	10.831***
Trend	0.001***	0.001***	0.001***	0.001***	0.000
January	-0.053***	0.042***	0.058***	0.057***	0.060***
February	-0.052***	0.260***	0.278***	0.256***	0.294***
March	-0.026***	0.085***	0.098***	0.111***	0.110***
April	0.027***	0.091***	0.107***	0.110***	0.121***
May	0.052***	0.157***	0.168***	0.175***	0.178***
June	0.071***	0.180***	0.193***	0.195***	0.200***
July	0.026***	0.162***	0.173***	0.175***	0.188***
August	0.005	0.139***	0.156***	0.160***	0.171***
September	-0.015***	0.079***	0.102***	0.101***	0.100***
October	-0.011*	0.082***	0.091***	0.093***	0.092***
November	0.020***	0.102***	0.117***	0.115***	0.110***
1 st Week of the month	-0.029***	-0.030***	-0.030***	-0.030***	-0.031***
2 nd Week of the month	-0.045***	-0.051***	-0.051***	-0.050***	-0.051***
3 rd Week of the month	0.000	-0.016***	-0.019***	-0.019***	-0.020***
December effect _{t-4}		-0.095***	-0.087***	-0.087***	-0.086***
December effect _{t-3}		0.089***	0.108***	0.107***	0.108***
December effect _{t-2}		0.216***	0.230***	0.229***	0.231***
December effect _{t-1}		0.131***	0.140***	0.137***	0.139***
December effect		0.107***	0.110***	0.112***	0.110***
Easter _{t-1}		-0.048***	-0.044***	-0.038***	-0.042***
Easter		0.100***	0.101***	0.108***	0.104***
Mother's day _{t-1}		-0.048***	-0.046***	-0.049***	-0.050***
Father's day _{t-1}		-0.029***	-0.027***	-0.026***	-0.022***
Father's day _{t+1}		-0.035***	-0.034***	-0.032***	-0.031***
Koninginnedag _{t+1}		0.099***	0.098***	0.098***	0.095***
Whitsun _{t-1}		-0.059***	-0.052***	-0.054***	-0.058***
Whitsun		-0.043***	-0.011	-0.011	-0.031*
Whitsun _{t+1}		-0.060***	-0.062***	-0.053***	-0.084***
Ascension day _{t-1}		0.113***	0.091***	0.087***	0.109***

Ascension day	0.030*	0.040**	0.029*	0.060***
Valentine's day _{t-1}	-0.119***	-0.104***	-0.136***	-0.109***
Valentine's day	-0.150***	-0.146***	-0.142***	-0.149***
Valentine's day _{t+1}	-0.230***	-0.230***	-0.209***	-0.230***
New Year's Eve _{t-1}	0.081***	0.079***	0.078***	0.076***
New Year's Eve	-0.071***	-0.068***	-0.068***	-0.071***
Summer_Region1 _{t-1}	-0.018***	-0.019***	-0.020***	-0.022***
Summer_Region1	-0.017***	-0.021***	-0.019***	-0.014**
Summer_Region3	-0.028***	-0.022***	-0.025***	-0.028***
Spring_Region1 _{t-1}	-0.050***	-0.049***	-0.057***	-0.043***
Spring_Region1 _{t+1}	-0.060***	-0.065***	-0.053***	-0.063***
Spring_Region2 _{t-1}	-0.130***	-0.130***	-0.110***	-0.133***
Spring_Region2	-0.063***	-0.077***	-0.041***	-0.071***
Spring_Region3 _{t-1}	-0.101***	-0.106***	-0.099***	-0.103***
Spring_Region3	-0.038**	-0.034**	-0.011	-0.033**
Spring_Region3 _{t+1}	-0.048***	-0.050***	-0.033**	-0.049***
Income_down	0.004	0.004	0.011**	-0.002
Consumers		0.007	0.011**	0.018***
Retailers		0.032***	0.019***	0.025***
KBPM_Branches		-0.015***	-0.014***	-0.026***
KBPM_GWB		0.032***	0.024***	0.010**
UPTO		-0.009*	-0.011**	-0.019***
PJG		-0.020***	-0.031***	-0.012
Impulse_Horst			-0.009	-0.010
Step_Horst			0.051***	0.133***
Impulse_Spillover_Horst			0.018	0.026
Step_Spillover_Horst			-0.082***	-0.003
Impulse_Control_Horst			-0.063***	-0.081***
Step_Control_Horst			0.036***	0.045***
1 st Cluster				0.034***
2 nd Cluster				0.030***
3 rd Cluster				0.031***
4 th Cluster				0.056***
5 th Cluster				0.038***
6 th Cluster				-0.066***
7 th Cluster				0.018**
8 th Cluster				-0.005
9 th Cluster				0.073***
10 th Cluster				0.007
11 th Cluster				0.017**
12 th Cluster				0.034***
13 th Cluster				0.001
No. of Observations	365	359	359	359
R ² (within)	0.000	0.715	0.720	0.745

*** 0.01 significance (2-tailed); ** 0.05 significance; * 0.10 significance.

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