DNB Working Paper

No. 328 / December 2011

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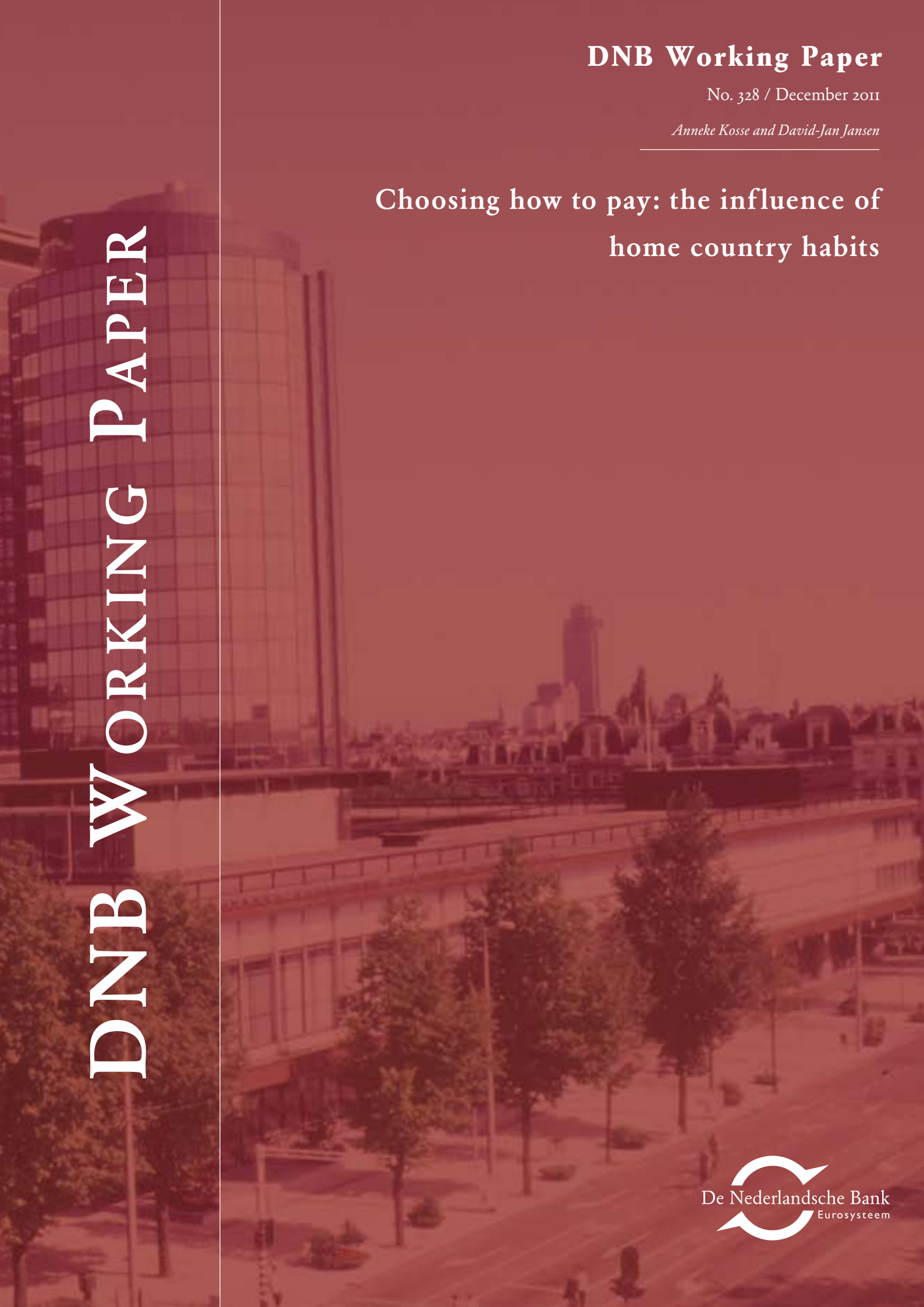
DNB WORKING PAPER



De Nederlandsche Bank
Eurosysteem

Choosing how to pay: the influence of home country habits

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

Working Paper No. 328

December 2011

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CHOOSING HOW TO PAY:

THE INFLUENCE OF HOME COUNTRY HABITS[1]

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Version: 14 December 2011

Abstract

Is having a foreign background a relevant factor in choosing between payment instruments in consumer point-of-sale transactions? We analyze this question using a unique diary survey in which both participants with a Dutch and a foreign background documented their daily purchases. Payment habits acquired in home countries continue to affect the mode of payment after migration. First generation migrants born in cash-oriented economies are more likely to use cash in point-of-sale transactions. However, the second-generation has similar payment habits as individuals with a Dutch background. This finding suggests that payment behaviour is not passed on from generation to generation, but moulded by host country payment habits. Finally, we suggest that special information campaigns to increase debit card usage will not have clear net social benefits.

Keywords: consumer payments, habits, debit card, cash, migration,

JEL-codes: C25, D12

[1] We gratefully acknowledge contributions to this project by Cindy Horbach, Lin Feei Lee and Maarten Jansen. We received useful comments from Wilko Bolt, Hans Brits, Nicole Jonker and seminar participants at various venues. Errors and omissions are our responsibility. Views expressed in this paper do not necessarily coincide with those of de Nederlandsche Bank.
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1 Introduction

In a point-of-sale (POS) transaction, a typical consumer has the choice between various payment instruments, such as cash, debit cards, cheques or credit cards. The payments literature (see, for example, Bolt and Chakravorti (2010) for a synopsis) suggests the choice will depend on various factors, such as transaction characteristics (e.g. the amount), location characteristics (e.g. the availability of a POS terminal), and cost structures (e.g. charges for using cards). In addition, many studies find that consumer characteristics are important. The intensity of using various methods of payment is usually related to demographic factors, such as age, education, income and gender (Boeschoten, 1998; Borzekowski et al., 2008; Klee, 2008; Stavins, 2001).

So far, little attention has been paid to payment choices made by migrants. Are the choices made by individuals with a foreign background in any way different? If so, can we explain these differences? This paper contributes to the literature by exploring the role of foreign backgrounds in payment instruments choice. To this end, we conducted an extensive diary survey among residents of the Netherlands with either a Dutch or a foreign background. Our paper sheds light on the role of home country payment habits and on possible changes in habits after migration. Various respondents in our survey have ties – either directly or through their parents - to countries where consumers have payment habits that differ from the Dutch situation. Using our unique dataset, we identify whether these habits still influence the choice between payment instruments in the Netherlands. A first key result is that respondents from countries where cash is often used, such as Germany, Morocco or Turkey, are more likely to use cash in POS transactions in the Netherlands. This conclusion is robust to including a variety of consumer, transaction and location characteristics.

In focusing on foreign backgrounds, our paper is related to work that reports differences in payment behaviour based on race or ethnicity (Borzekowski and Kiser, 2008; Borzekowski et al., 2008; Ching and Hayashi, 2010; Federal Reserve System, 2004; Mann, 2011; Schuh and Stavins, 2010). However, these papers usually do not have information on respondents' home countries. Also, these papers do not distinguish between different generations. In contrast, we are able to assess whether payment habits are passed on from generation to generation. To this end, we use information on whether an individual was born abroad (first-generation migrant), or whether her parents were born

abroad (second-generation migrant). Here, our second key finding is a sure adjustment to host country modes of payments. Differences in payment behaviour are only present for first-generation migrants. We do not find differences in usage of payment instruments between second-generation migrants and respondents with a Dutch background.

On the basis of our two main results, we discuss potential implications for policy. Several studies have shown that the way consumers pay for their POS transactions significantly affect the overall efficiency of a payment system.[4] In general, substitution of cash by debit cards is found to reduce social costs. On the one hand, we do find differences in payments habits for several migrant groups. On the other hand, our results show that payment habits change over time. Second-generation migrants do not take over their parents' habits, but adjust to host country modes of payment instead. We use a stylized analysis to assess the net social benefits of dedicated and specialized education or information material targeted at payment habits of first-generation migrants from cash-oriented countries. Given the relatively high costs of such a campaign, it is not certain that the net social benefits will be positive.

This paper proceeds as follows: section 2 presents a selective review of the relevant literature, both in the context of payments and use of financial services in general. Section 3 presents background information about Dutch migrant groups and home country payment patterns. Section 4 describes the methodology and data. Section 5 analyzes the role of home country factors in choosing between payment instruments. Section 6 reports additional results, while section 7 concludes and discusses policy implications.

2 Related literature

A substantial amount of empirical research examines consumer payment choice from a micro-perspective.[5] Due to the lack of accurate transaction data, most empirical studies are based on self-

[4] See for example EIM (2011) and Bolt and Chakravorti (2010).
[5] The theoretical literature on consumer payment choice starts from the idea of heterogeneous consumer preferences based on comparative product attributes and distinct consumer needs. Each payment instrument differs from the other with respect to costs, safety, anonymity, speed, acceptance and other characteristics and each consumer attaches a different importance to each of these characteristics. In the end, consumer choice of which payment instrument to use is based on their net benefits received (see Bolt and Chakravorti (2010) and references therein).

reported survey data.[6] Overall, the literature agrees that consumer payment choice at the POS and the adoption of the electronic means of payment is influenced by consumer, transaction and situational characteristics as well as by financial incentives.[7]

First, demographic factors are relevant. A common finding is that the use of electronic means of payment is negatively correlated with age and positively related with a consumer's education and income level. Younger, more educated consumers with higher incomes are more likely to use electronic payment instruments, either at the POS or in remote transactions. In contrast, the elderly, consumers who have received less education and those with lower incomes are more prone to using cash or other paper-based instruments. The rationale is that young and more educated people are more open to new technologies and that young people lack the history of relying on paper-based payments. Moreover, educated and high-income people have higher opportunity costs, and dislike the greater amount of time it takes to initiate paper-based versus electronic transactions (Kennickell and Kwast, 1997; Humphrey et al., 2001). In addition, some studies find a role for gender and region. Women are more likely than men to use electronic payment media, such as payment cards or electronic bill payments. Furthermore, the probability of paying by cards instead of cash is found to decrease with the urbanization degree of consumers' living environment (Jonker, 2007; Kosse, 2010). This might capture adoption and acceptance related determinants, such as the regional density of ATMs and POS terminals. Moreover, Stavins (2001) finds that the fraction of other people in the region using the same type of payment instrument is also affecting consumers' usage patterns. This may not only indicate demand-related network effects, but also that own use of payment instruments is influenced by others' habits.

Second, consumer payment choice is found to depend on transaction characteristics, such as the transaction amount and the type of good purchased. The size of the transaction is found to be a major determinant of consumers' payment choice at the POS. Higher transaction amounts are more

[6] A few empirical studies use transaction data provided by banks, grocery stores or credit card companies (Humphrey et al., 2001; Rysman, 2007; Klee, 2008). Others have examined payment choice over time using aggregate data supplied by payment systems and data from industry sources (Humphrey et al., 1996; Jonker and Kettenis, 2007; Amromin and Chakravorti, 2009; Bolt et al, 2008).

[7] The many relevant references include Kennickell and Kwast (1997), Mantel (2000), Stavins (2001), Mester (2006), Borzekowski et al. (2008), Borzekowski and Kiser (2008), Klee (2008), Hyytinen and Takalo (2009), Von Kalckreuth et al. (2009), Zinman (2009), Ching and Hayashi (2010), Kosse (2010), Schuh and Stavins (2010).

likely to be paid by cards instead of cash, while cash is highly preferred for small-value transactions (Boeschoten, 1998; Bounie and François, 2006; Jonker, 2007; Klee, 2008; Von Kalckreuth et al., 2009).

Third, location matters. For instance, the absence of a cashier, e.g. at vending machines, usually increases the probability of a cash payment (Hayashi and Klee, 2003). Bounie and François (2006) and Jonker (2007) also show that payment choices differ according to the location, which most probably reflects the different levels of penetration of payment terminals across stores and sectors. Rysman (2007) for example, demonstrates that consumer payment choice is highly correlated with the level of card acceptance by retailers.

Fourth, consumer payment choices are found to be influenced by financial incentives. Bolt et al. (2010) demonstrate that consumers react strongly to transaction charges imposed by retailers for particular payment instruments. In addition, explicit pricing by banks is shown to affect payment choices (Barron et al., 1992; Amromin et al., 2007; Chakravorti, 2010). The payments literature has also shown significantly large and positive effects of incentive and reward programs (Ching and Hayashi, 2010; Sprenger and Stavins, 2008; Arango et al., 2011) and card discounts, points and cash-backs are generally found to have a positive effect on the use of payment cards relative to cash (Carbó-Valverde and Liñares-Zegarra, 2009).

In focusing on foreign backgrounds, our paper is related to work that reports differences in payment behaviour based on race or ethnicity (Borzekowski and Kiser, 2008; Borzekowski et al., 2008; Ching and Hayashi, 2010; Federal Reserve System, 2004; Mann, 2011; Schuh and Stavins, 2010). However, these papers often only include race as additional covariates. In other fields, the role of foreign backgrounds has been studied more extensively. A dimension that receives increasing attention is migrant participation in financial service markets. Immigrants tend to be less 'banked' than the native population. Osili and Paulson (2009), for example, show that immigrants are less likely to own a saving and checking account compared to the native-born. Jankowski et al. (2007) analyze currency demand in Chicago and find that Latin American immigrants demand more $100 bills than other residents. Since these bills are mainly held as a store of value instead of for payment purposes, the results may either indicate barriers that Latin American immigrants face or their reluctance to open

and maintain bank accounts. Studying the demand for large banknotes in Swiss, however, Fischer (2010) finds that immigrants, due to wealth and age effects, hoard less than natives.

There is evidence that the culture of the country-of-origin influences behaviour of immigrants in host countries. Osili and Paulson (2008a) find that immigrants from countries with more effective institutions are more likely than other immigrants to have a relationship with a bank and to use formal financial markets more extensively. Jankowski et al. (2007) and Osili and Paulson (2009) too, claim that immigrants from countries having a strong institutional environment may be more likely to have a bank account in their host country, whereas immigrants having experienced financial crises in their home countries might be less likely to participate in the host country's financial system. Also, there is evidence that immigrants from countries with institutions that more effectively protect private property are more likely to own stock in the United States (Osili and Paulson, 2008b). Kok et al. (2011) find that a high female participation rate in the home country correlates with a high female participation rate in the host country. This home country effect, however, vanishes over generations, with second-generation migrants being more influenced by the culture of the host country.

3 Dutch immigrants and home country payment habits

In 2010, residents with a foreign background made up twenty percent of the Dutch population.[8] For many years, migrants from non-western countries have made up the largest share of migrants, with the majority originating from Turkey and Morocco, followed by Suriname and the Antilles/Aruba (see Table 1). Migration from Turkey and Morocco started in the 1960's, when there was a high demand for low-skilled workers which could not be fulfilled by the immigrant workers from Spain and Italy. Many of the Turkish and Moroccan workers stayed and their families migrated to the Netherlands during the subsequent decades (Kok et al., 2011). The inflow of Surinam migrants started in the 1950's and mainly concerned young people who came to study (CGM, 2011). Since its independence in 1975, however, migration from Suriname has mainly been driven by a demand for labour, better job opportunities and political reasons. The migration pattern from the Antilles shows similar patterns.

[8] This estimate refers to the Dutch population of 15 years and older, which by the end of 2010 was estimated to be 13.5 million, 2.6 million of which were defined as migrants.

Initially, Antilleans came to the Netherlands to take up a study, but as from the mid 1990's more and more Antilleans have migrated to the Netherlands in the hope of finding prosperity. The largest share of western immigrants originates from Indonesia (the then Netherlands East Indies) (Statistics Netherlands, 2010). They largely came to the Netherlands after the decolonization of Indonesia directly after the Second World War. Germans make up the second largest group of western immigrants, followed by people from other European countries (Kok et al., 2011). Especially the share of migrant workers from Eastern Europe has strongly increased since the entry of Poland, Bulgaria and Romania into the European Union in 2004 and 2007.

<TABLE 1 ABOUT HERE>

For some groups of immigrants, payment habits in their respective home countries differ substantially from those in the Netherlands. To examine this, we collected several indicators of payment habits at the POS in the various countries-of-origin of our survey respondents.[9] For the sake of comparability, all the indicators were taken from the World Bank (2008). Figure 1 gives an illustration. In the Netherlands, payment cards are used extensively at the POS. In particular, debit cards are heavily used. In 2006, Dutch inhabitants owned on average 1.6 debit cards per person and they used their debit card about 90 times a year. In Great-Britain, debit card possession and usage is somewhat lower, with 1.1 debit cards per person and around 75 debit card transactions a year. However, UK consumers more often have and use a credit card. Despite being a neighbouring country, payment behaviour in Germany substantially differs. Most Germans own a debit card, but they use it less extensively than the Dutch. Instead, they rely heavily on cash (see also Von Kalckreuth et al. (2009)). In Morocco, Indonesia, Poland and Turkey as well, payment cards are significantly less often used for paying for POS purchases, pointing at a greater reliance on cash.

<FIGURE 1 ABOUT HERE>

[9] Unfortunately, data on payment habits in Suriname were unavailable.

4 Survey methodology and data description

To examine the effect of home country factors, we conducted an extensive survey among Dutch consumers, both with a domestic and a foreign background. The data collection took place between March and July 2009. The survey was designed so to gather sufficient data on the various ethnicity groups living in the Netherlands. These groups were defined using the official definitions by Statistics Netherlands (see table 2). The first group were individuals with a Dutch background, which means that both parents are born in the Netherlands.[10] The aim was to have at least 400 observations (individuals) for this group. The second group were individuals with a foreign background, meaning that at least one of the parents is not born in the Netherlands. For this group, a target of 1,600 persons was specified. Within this group, it is possible to make two further subdivisions. If the person itself is born outside of the Netherlands, she is classified as a first-generation individual with a foreign background. If the country of birth is the Netherlands, then she is seen as second-generation. A second distinction is that between western and non-western. For first-generation individuals, if the country of birth is in Europe (excluding Turkey), North America, Oceania, Indonesia or Japan, that person is seen as western. For second-generation persons with foreign backgrounds, the distinction between western and non-western is first based on the country of birth of the mother. If the mother is born in the Netherlands, then the father's birthplace is used. The aim was to have at least 400 persons with a western background, and 1,200 individuals with a non-western background. The sample of non-western individuals was selected in such a way that the four major countries-of-origin, i.e. Turkey, Morocco, Suriname and the Netherlands Antilles, were adequately represented.

<TABLE 2 ABOUT HERE>

Ethnic minorities are usually underrepresented in consumer surveys, due to the complexity and high costs of reaching and approaching them. Also, the rate of response is often quite low (Schmeets and Van der Bie, 2006). In order to accommodate to the specific characteristics and attitudes of these

[10] Note that the country of birth of the individual is not relevant under this defintion.

groups and to minimize non-response, we used a combination of survey techniques.[11] Respondents with a Dutch or western background were mainly selected using an existing internet panel. This group also answered the questionnaire online. However, to mitigate a potential bias, non-internet users were contacted by letter. If they were willing to participate, they were subsequently approached for face-to-face interviews. Virtually all respondents with a Turkish, Moroccan, Surinam and Antillean background were selected using a quota procedure, where the interviewers used their own networks and visited specific places with a high probability of encountering the targeted respondents. The Surinam and Antillean respondents were subsequently surveyed in a face-to-face interview. Respondents with a Moroccan and Turkish background, however, were more reluctant about a face-to-face survey. Also in case of interviewers with a Moroccan or Turkish background. In particular, they had reservations about providing personal and financial information to the interviewer. Also, there was fear of making mistakes because of insufficient command of the Dutch language. To address these concerns, paper-based interview techniques were used for these particular groups.

The survey consisted of two parts. First, respondents were asked to document their expenses during one day in a transaction diary.[12] The request was to register the time of the purchase, the location, the method of payment, the transaction amount and whether the transaction was business or private. Regarding the location, a pre-defined set of twenty types was given. The second part of the survey was a list of detailed background questions, including questions on preferences for and perceptions of payments instruments.

Turning to a description of the data, table 3 presents an overview. The target number of respondents was met for all the groups. The sample includes 620 individuals with a Dutch background and 1,638 respondents with a foreign background. Column 2 summarizes consumer characteristics for all 2,258 individuals in our sample. As a benchmark, column 1 and the last line of the table present

[11] Using a combination of survey methods may possibly introduce biases. As demonstrated by Jonker and Kosse (2009), the survey methodology used may significantly affect consumers' registration of payments. However, given the consistency in survey setup, design and length, the effects of using online, face-to-face and paper-based techniques are expected to be limited.

[12] Jonker and Kosse (2009) demonstrate that one-day transaction diaries are the preferred methodology for assessing payment behaviour. One-week registration methods and retrospective interviews are shown to lead to a significant increase of incomplete recall and zero observations due to diary fatigue and diary exhaustion.

information on the Dutch population based on data from Statistics Netherlands. Columns 3 to 8 present a breakdown based on backgrounds.

<TABLE 3 ABOUT HERE>

The sample differs on a number of dimensions from the Dutch population. On average, the respondents are younger, more likely to be female, less highly educated, and more likely to live in an urban environment in the western part of the Netherlands. Also, given the survey design, persons with a foreign background are overrepresented. Given these differences, we constructed sampling weights based on gender, age, education, degree of urbanization, region where the individual lived, and the ethnic background, which we will use in all regressions.

Table 4 shows information on the number of cash and debit card payments recorded by the various groups.[13] For the full sample, the average number of cash payments was roughly 1.6 per person per day, compared to 0.7 for the number of debit card payments. The ratio of cash payments versus the total number of payments is fairly equal across the various groups, with one clear exception. For first-generation non-western respondents, the ratio is around 0.75, compared to 0.66 for the other groups.

<TABLE 4 ABOUT HERE>

5 Cash or debit card: results

We now turn to a more formal analysis of the choice between cash or debit card. Given the binary nature of our dependent variable, we used probit regression techniques.[14] We first ran a benchmark probit regression without variables on home country characteristics. The dependent variable is a binary dummy measuring the use of cash in point-of-sale transactions. In total, we analyze 4,225 cash and

[13] We focus on cash and debit cards only, as these two payment instrument were by far the most common in our survey. This is not surprising since other instruments, such as the credit card and the e-purse are rarely used in the Netherlands: about 97 percent of total POS transactions are paid by cash or debit card.

[14] We do not fully exploit the panel dimension of our dataset. However, per individual, we often observe few transactions only. Of the people who reported at least one transaction, 25% reported only one, 26% reported two and 18% reported three purchases.

debit card transactions. We ran the probit regressions using a rich set of covariates, consisting of consumer, transaction and location characteristics suggested by the literature.[15] The consumer characteristics include the following variables: gender, age, education, income category, marital status, household size, homeownership, region (north, east or south), ZIP code, the number of bank accounts abroad, and the amount of cash in pocket at the start of the day. The reference category is a debit card payment made by a male, from the age group between 35 and 44, whose highest qualification is primary school. The transaction characteristics include the amount of the transaction, whether the transaction was private or business and the day of the week (Monday to Saturday). In addition, we used dummies for the various pre-defined locations where the transaction occurred. As a benchmark location, we use the supermarket, which accounted for 28% of all transactions. As a final control, we include the type of survey instrument used (internet, face-to-face or paper-based).

Table 5 shows parameter estimates and standard errors (in italics) for the benchmark probit model. We only show results for selected covariates. Regarding the consumer characteristics, there are a number of intuitive results. In accordance with the existing payments literature, we find that age and education play a significant role, with younger, more educated consumers being more likely to pay electronically. However, we find no differences between males and females. The negative parameter suggests that females are less likely to use cash, but the effect is not significantly different from zero. Our results further show that consumers having a partner are less likely to use cash. One explanation could be a wealth effect, which would be in line with earlier findings of higher income people being more prone to use electronic payment instruments. Moreover, the amount of cash that people carry with them has a significant positive relation to cash usage during the day. Regarding the transaction characteristics, the findings are as expected. Higher transaction values are less likely to be paid in cash. In terms of location, cash is more often used at street vendors, at small food stores and in restaurants and bars. Purchases made at fashion and shoe stores and at gas stations, by contrast, are more often paid by debit card. Since we have already controlled for differences in transaction values explicitly, these findings most probably reflect the different levels of debit card acceptance across the

[15] For our analysis, the role of financial incentives reported in the literature is not relevant. Using cash or debit cards carry no explicit bank imposed costs in the Netherlands, and incentive and reward programs are rare.

different types of stores.[16] Finally, there is an indication that consumers are more likely to use their debit cards on Wednesday.

<TABLE 5 ABOUT HERE>

In the next step, we include variables measuring foreign background into the benchmark probit model. We do this in two parts. First, we use binary dummies following the official classifications by Statistics Netherlands, which were discussed in table 2. So, we use dummies that measure whether an individual has a foreign background, from which region she stems, and whether she is a first or second-generation migrant. Second, we further refine the analysis by using binary dummies defined – as much as possible - on a person's country-of-origin.[17] The results for the first exercise are presented in table 6, while the results for the second analysis are in table 7. Both tables present average marginal effects rather than parameter estimates.

First of all, we find no overall difference between individuals with Dutch and foreign backgrounds. Someone with a foreign background is around 1.8 percentage points (pp) more likely to use cash, but the effect is not significantly different from zero (table 6, column 1). When we split the data based on generations, again we find no significant differences, although there is a hint of differences between generations (column 2). For second-generation migrants, the marginal effect is essentially zero, whereas for first-generation migrants, the probability of choosing cash is around 3 pp higher. When we take the region-of-origin into account (column 3), there is an indication that persons with non-western backgrounds are more likely to use cash. Again, though, the differences are not significant. When we combine the information on region and generation (column 4), we find one clear difference between foreign and domestic backgrounds. For first-generation migrants with a non-western origin, the probability of using cash is 6 pp higher compared to persons with a Dutch background. For second-generation non-westerners, the chances of using cash are actually smaller, by

[16] About 90% of all Dutch retail traders are able to accept debit card payments. The levels of penetration of payment terminals, however, considerably differs across different types of stores: supermarkets (100%), gas stations (100%), fashion stores (97%), specialized food stores (82%), catering (64%) and street vendors (28%) (HBD, 2010; EIM, 2011).

[17] We still aggregate Eastern European and other European countries, as we have too few observations from individual countries in these groups.

0.7 pp, although not significantly different. For individuals from western countries, there are no significant differences.

<TABLE 6 ABOUT HERE>

Overall, the results in table 6 suggest that region-of-origin and generation are relevant factors for payment behaviour. Table 7 further expands the analysis by using information on the country-of-birth (column 1) and a further break-down by generations (column 2). First, there are strong indications that individuals with a background in cash-oriented economies continue to have strong preferences for cash. Those participants with a German background are around 9.3 pp more likely to choose cash, while persons with Turkish and Moroccan origins are around 7.5 pp more probable to pay cash. Once again, differences between generations are relevant (column 2). For individuals with German, Turkish or Moroccan backgrounds,the higher usage of cash is restricted to the first generation. In fact, for second-generation persons with Turkish or Moroccan origins, the differences with the reference group are negligible. For those participants with German origins, the difference is still around 6 pp for the second-generation, but no longer significant.

<TABLE 7 ABOUT HERE>

6 Sensitivity analysis

As a first check, we focus on payments exclusively made in supermarkets and gas stations. This serves as an additional check on any supply related factors, such as the (un)availability of POS terminals. Both sectors are homogeneous in terms of payment acceptance as in virtually all supermarkets and gas stations consumers have the opportunity to choose between cash or debit cards. As shown in table 8, we find no differences between persons with Dutch and foreign backgrounds when it comes to paying in supermarkets (column 1). Neither the region-of-origin nor the generation are relevant factors for payment choices made for supermarket purchases. First-generation non-westerners are 4.7 pp more likely to pay in cash, but the differences are not significant.

Turning to payments at gas stations (column 2), however, we do find a significant difference: the probability of using cash is 13 pp higher compared to individuals with Dutch backgrounds. For the other groups as well, the likelihood of using cash is higher, although not significantly different. The results confirm our earlier finding. Again, the only differences in payment methods are present for first generation non-westerners. Since we have accounted for location related characteristics, and in particular for the availability of payment terminals, this difference is consumer-related. The reason why we only find different payment patterns in gas stations and not in supermarkets can be attributed to the fact that they are two very different sectors regarding the type and size of purchases done and the share of cash and debit cards used. Overall, 60% of all supermarket transactions and 37% of total supermarket sales are paid by cash, whereas in gas stations the share of cash is significantly lower; 44% of all transactions and 18% of total sales (Hernandez Hernandez et al., 2011). The stronger preference for cash among first-generation non-westerners is therefore clearly emphasized in this latter debit card prevailing sector.

<TABLE 8 ABOUT HERE>

Second, there may be an endogeneity issue regarding the explanatory variable 'cash-at-start', which we include to model payment choice. Consumers having a higher preference for cash, can be expected to have more cash on them. Therefore, the amount of money carried may not be entirely exogenous. To explore this possible endogeneity, we re-ran the regressions without the variable 'cash-at-start'. Overall, there were no substantial changes to our conclusions on the role of foreign backgrounds. Both marginal effects and standard errors were broadly similar. Biases due to the possibly endogenous nature of this variable are therefore concluded to be limited.

7 Conclusions and policy implications

This paper examines a detailed set of transaction and consumer data that was collected through a diary survey. The innovative aspect of this diary survey is that we have detailed information on both individuals with a Dutch and with a foreign background. A first key finding is that home country

payment habits are relevant for choosing payment instruments after migration. In particular, persons from cash-oriented economies are still more likely to use cash in POS transactions. This finding is robust to controlling for a range of consumer, transaction and location characteristics. Second, we find that payment habits of the migrant population change over time. For second-generation migrants, there is no longer evidence of different payment habits compared to individuals with a domestic background.

Turning to policy implications, is there a case for targeted education or information campaigns? For instance, in the Netherlands one recent campaign set up by banks and retailers encouraged consumers to use debit cards also for small transactions. A further replacement of cash by debit card payments may foster the social efficiency and safety of the payment system.[18] Debit card transactions are usually cheaper for banks and retailers and for safety reasons, many retailers prefer to have a minimum of cash in their till. By enticing people to turn away from cash to debit cards, potential efficiciency gains could be reaped. However, would it be worthwhile to develop specially targeted programs for first-generation migrants from cash-oriented economies? First, we find that payment choices are mainly driven by habits, which are generally difficult to change. This suggests a campaign would be relatively costly and long-term. Second, as noted in section 4, it is generally difficult to approach the particular groups that show higher preferences for cash. Again, this would imply that a campaign would be relatively costly. Third, one needs to consider how much substitution from cash to debit card payments a campaign could generate. In all likelihood, an educational campaign will only affect payment habits of a fraction of the target group with high cash preferences. A stylized analysis is useful here to put potential net benefits in perspective.[19] In the most optimistic scenario, suppose the campaign is fully successful by reducing the cash ratio of individuals from cash-oriented economies from 74% to the average level of 66%. This means a substitution of 0.2 cash payments per person per day, adding up to a replacement of 36.5 million cash payments a year. Assuming an average value of cash payments of EUR 12.19 (Hernandez Hernandez, 2011), the total

[18] See for example EIM (2011) and Bolt and Chakravorti (2010).

[19] For this calculation, we combine cost estimates reported in Brits and Winder (2005), McKinsey&Company (2006) and EIM (2007). Following Brits and Winder (2005), we only consider variable costs and distinguish between costs varying with the number of transactions and costs varying with the value of the transactions. Further details of this calculation are available upon request.

direct social costs saved would amount to EUR 3.3 million. In light of the total social costs of POS payments in the Netherlands, this is still a modest efficiency gain.[20] Overall, given the relatively high costs of a specialized education or information campaign, it is not certain that the net social benefits would be positive.

[20] In 2002, the total costs of all POS payments in the Netherlands added up to EUR 2.9 billion or, equivalently, 0.65% of gdp (Brits and Winder, 2005).

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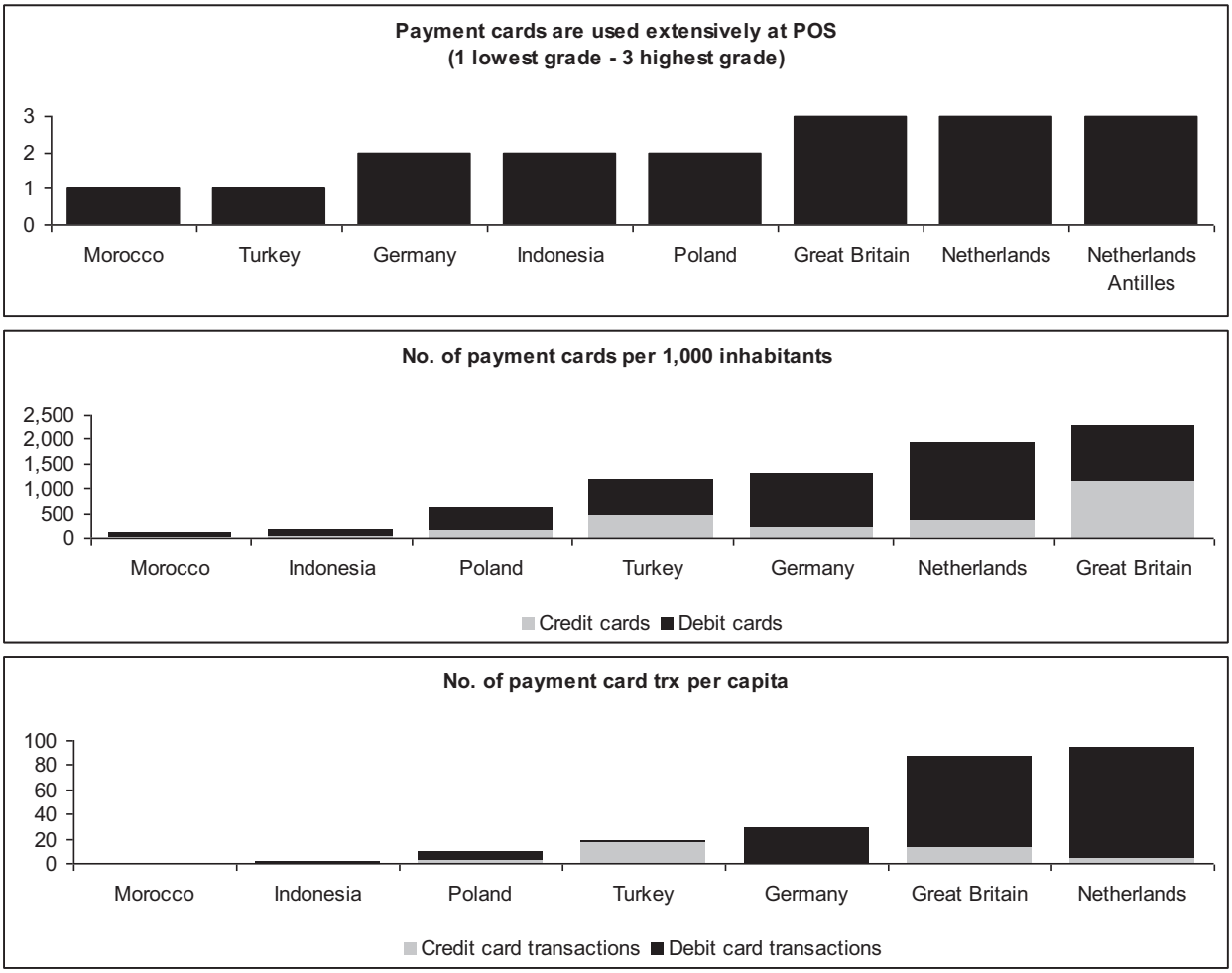
Figure 1: Payment card usage in different home countries – 2006



Source: World Bank, Payment Systems Worldwide, a Snapsnot, Outcome of the Global Payment Systems Survey, 2008

Table 1: Overview Dutch population (15 years and older)

Background	**Total population**	**%**
Turkey	271,660	21%
Morocco	227,809	18%
Suriname, Antilles, Aruba	365,558	28%
Other non-western	426,318	33%
Total non-western	**1,291,345**	**100%**
Of which:		
1st generation non-western	*973,214*	75%
2nd generation non-western	*318,131*	25%
Indonesia	368,447	29%
Germany	346,510	27%
Eastern Europe	185,386	15%
Other western	360,851	29%
Total western	**1,261,194**	**100%**
Of which:		
1st generation western	*569,030*	45%
2nd generation western	*692,164*	55%
Total immigrants	2,552,539	19%
Total native population	10,917,136	81%
Total Dutch population	**13,469,675**	**100%**

Source: Statistics Netherlands, 2008

Table 2: Classification of foreign backgrounds

DESCRIPTION	**CRITERIA**	
	Country of birth	*Country of birth parents*
Dutch background	Not relevant	The Netherlands
Foreign background		At least one of the parents not born in the Netherlands
1st generation foreign background	Not in the Netherlands	At least one of the parents not born in the Netherlands
2nd generation foreign background	The Netherlands	At least one of the parents not born in the Netherlands
Western background	A country in Europe (excl. Turkey), North America, Oceania, Indonesia or Japan	At least one of the parents not born in the Netherlands
Non-western background	A country in Africa, South America, Asia (excl. Indonesia and Japan) or Turkey.	At least one of the parents not born in the Netherlands

Note : This table provides information on the official classification of individuals with foreign backgrounds, as defined by Statistics Netherlands. Source: http://www.cbs.nl/en-GB/menu/themas/dossiers/allochtonen/methoden/begrippen/default.htm?ConceptID=37

Table 3: Characteristics of survey participants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Population	**Full sample**	**Background**					
			Dutch	**Foreign**				
				all	*western*		*non-western*	
					1st gen.	*2nd gen.*	*1st gen.*	*2nd gen.*
Female	0.49	0.53	0.54	0.53	0.56	0.53	0.52	0.52
Age	46.9	41.4	48.4	38.7	50.0	48.1	42.0	26.5
Education								
- none		0.04	0.01	0.04	0.02	0.00	0.09	0.01
- primary	0.08	0.15	0.12	0.16	0.03	0.11	0.23	0.13
- secondary	0.64	0.6	0.61	0.59	0.59	0.63	0.55	0.63
- BA	0.17	0.17	0.2	0.15	0.22	0.18	0.1	0.19
- MA	0.10	0.05	0.05	0.05	0.15	0.07	0.04	0.04
Income								
- none		0.09	0.08	0.09	0.04	0.07	0.09	0.12
- < 1000		0.27	0.22	0.29	0.29	0.21	0.26	0.37
- 1000-2000		0.33	0.32	0.33	0.34	0.27	0.42	0.25
- 2000-3000		0.19	0.22	0.17	0.15	0.26	0.15	0.14
- > 3000		0.13	0.16	0.12	0.18	0.19	0.08	0.12
With partner	0.62	0.64	0.66	0.63	0.83	0.79	0.71	0.4
Urban	3.0	3.8	3.2	4.0	3.7	3.5	4.2	4.2
Region								
- west		0.58	0.43	0.64	0.56	0.51	0.66	0.7
- north		0.06	0.1	0.05	0.11	0.05	0.05	0.03
- east		0.16	0.2	0.14	0.2	0.15	0.13	0.14
- south		0.2	0.27	0.17	0.13	0.29	0.16	0.13
Bank account (NL)		0.98	1.00	0.97	0.99	1.00	0.96	0.97
# bank accounts (NL)		1.6	1.7	1.5	1.9	1.8	1.4	1.4
Bank account (abroad)		0.06	0.01	0.07	0.11	0.01	0.11	0.04
Ever use debit card?		0.94	0.96	0.93	0.97	0.99	0.89	0.94
# respondents		2,258	620	1,638	123	272	724	519
Fraction of total								
- in sample			0.27	0.73	0.05	0.12	0.32	0.23
- in population			0.80	0.20	0.04	0.05	0.06	0.05

Note: This table summarizes the various control variables for the respondents to the survey. Column 2 describes the full sample, while columns 3 to 8 show summaries for various background categories. Column 1 gives data for the Dutch population based on Statistics Netherlands (www.cbs.nl, population aged over 15). Numbers represent fractions, with the exception of age and the number of bank accounts, which are shown in averages, and the number of respondents, which are shown in totals. The data shown from the survey are un-weighted.

Table 4: Payment characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full sample	**Background**					
		Dutch	**Foreign**				
			all	*western*		*non-western*	
				1st gen.	*2nd gen.*	*1st gen.*	*2nd gen.*
# cash payments	1.61	1.50	1.66	1.70	1.45	1.80	1.56
# debit card payments	0.73	0.74	0.73	0.86	0.75	0.64	0.80
Ratio cash/total	0.69	0.67	0.69	0.66	0.66	0.74	0.66
Cash at start (EUR)	26.4	28.0	25.5	35.4	30.3	30.5	20.0

Note: This table gives information on the number of cash and debit card payments recorded per person per day for various categories. Column 1 describes the full sample, while columns 2 to 7 show summaries for various background categories. Numbers represent un-weighted averages.

Table 5: Using cash over debit card: the role of consumer, transaction and location characteristics

Consumer characteristics	
Female	-0.07
	0.08
Age	
- 15-24	-0.03
	0.16
- 25-34	0.01
	0.12
- 45-54	0.13
	0.12
- 55-64	0.35**
	0.14
- 65 and older	0.16
	0.13
Education	
- secondary	-0.28*
	0.13
- bachelor	-0.66**
	0.16
- master	-0.49*
	0.20
Partner	-0.21*
	0.10
Cash at start of day	0.00**
	0.00
Transaction and location characteristics	
Amount	-0.01**
	0.00
Location	
- Street vendor	1.46**
	0.24
- Food (small shop)	0.67**
	0.15
- Fashion/shoes	-0.89**
	0.21
- Restaurant/bar	0.76**
	0.13
- Gas station	-0.69**
	0.15
Day of week	
- Wednesday	-0.43*
	0.20
Constant	0.62
	0.52

Parameter estimates and standard errors (in italics) for a probit regression, where the dependent variable is a binary dummy equal to 1 in case of cash payments and 0 in case of debit card payments. The results are based on 4,225 transactions. The model includes a full set of variables, described in the main text. The table shows results for selected covariates. Observations are weighted on the basis of gender, age, education, ethnic background, degree of urbanization and region. ** $p<0.01$, * $p<0.05$.

Table 6: Using cash over debit card: the role of home country factors

	(1)	(2)	(3)	(4)
Foreign background	0.018			
	0.019			
1st generation		0.029		
		0.023		
2nd generation		0.001		
		0.021		
Western			0.005	
			0.023	
Non-western			0.038	
			0.023	
1st gen. western				-0.003
				0.034
1st gen. non-western				0.060*
				0.024
2nd gen. western				0.012
				0.025
2nd gen. non-western				-0.007
				0.030

Marginal effects and standard errors (in italics) based on probit regressions. The dependent variable is a binary dummy equal to 1 in case of cash payments and 0 in case of debit card payments. This table classifies individuals with a foreign background according to the official definitions of Statistics Netherlands. The regression includes a full set of control variables, described in the main text. The reference category is a debit card payment in a supermarket by a male with a Dutch background, from the age group between 35 and 44, whose highest qualification is primary school. Results are based on 4,225 observations for columns 1 and 3, and on 4,214 observations for columns 2 and 4. Observations were weighted on the basis of gender, age, education, ethnic background, degree of urbanization and region. * $p<0.05$.

Table 7: Using cash over debit card: results using countries-of-origin

	(1)	(2)
Germany	**0.093***	
	0.032	
1st generation		**0.129***
		0.047
2nd generation		0.063
		0.040
Eastern Europe	0.023	
	0.038	
1st generation		0.003
		0.053
2nd generation		0.057
		0.046
Europe (other)	-0.054	
	0.043	
1st generation		-0.114
		0.079
2nd generation		-0.020
		0.046
Indonesia	-0.033	
	0.037	
1st generation		-0.020
		0.066
2nd generation		-0.045
		0.039
Surinam	0.024	
	0.026	
1st generation		0.041
		0.031
2nd generation		-0.008
		-0.008
Netherlands Antilles	-0.012	
	0.032	
1st generation		0.020
		0.037
2nd generation		-0.078
		0.050
Turkey	**0.075***	
	0.030	
1st generation		**0.089***
		0.034
2nd generation		0.023
		0.040
Morocco	**0.074***	
	0.033	
1st generation		**0.088***
		0.038
2nd generation		0.033
		0.043

Marginal effects and standard errors (in italics) based on probit regressions. The dependent variable is a binary dummy equal to 1 in case of cash payments and 0 in case of debit card payments. This table classifies individuals with a foreign background according to their country-of-origin (column 1). Column 2 is based on a further analysis of the data based on generation (column 2). The regression includes a full set of control variables, described in the main text. The reference category is a debit card payment in a supermarket by a male with a Dutch background, from the age group between 35 and 44, whose highest qualification is primary school. Results are based on 4,225 transactions in column 1 and on 4,214 transactions in column 2. Observations are weighted on the basis of gender, age, education, ethnic background, degree of urbanization and region. * $p<0.05$.

Table 8: Using cash over debit card: focusing on payments in supermarkets and gas stations

	(1) **Supermarket**	(2) **Gas station**
1st generation		
western	-0.010	0.160
	0.058	*0.106*
non-western	0.047	**0.132***
	0.046	*0.060*
2nd generation		
western	0.009	0.075
	0.047	*0.068*
non-western	-0.050	0.048
	0.056	*0.073*

Marginal effects and standard errors (in italics) based on probit regressions. The dependent variable is a binary dummy equal to 1 in case of cash payments and 0 in case of debit card payments. Column 1 uses 1,208 purchases made in supermarkets, while column 2 only uses 273 payments made at gas stations. The regressions include a full set of control variables, described in the main text. The reference category is a debit card payment made by a male with a Dutch background, from the age group between 35 and 44, whose highest qualification is primary school. Observations are weighted on the basis of gender, age, education, ethnic background, degree of urbanization and region. * $p<0.05$.

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