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From cash to cards: how debit card payments overtook cash in the Netherlands

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From cash to cards: how debit card payments overtook cash in the Netherlands

Nicole Jonker (De Nederlandsche Bank), Lola Hernandez (De Nederlandsche Bank), Renate de Vree (Dutch Payments Association) and Patricia Zwaan (Dutch Payments Association)

12 May 2017

Abstract:

In this study, we present and discuss the results of a longitudinal survey on consumers' payment behaviour carried out yearly during the period 2010 to 2016. We have collected data among 119,117 Dutch consumers aged 12 years and older using single day payment diaries. Between 2010 and 2013 the field work was carried out in September, whereas from 2014 onwards the field work has taken place during the whole year. The results reveal a gradual substitution of cash by debit card payments between 2010 and 2016. Between 2012 and 2013, the substitution process slowed down, probably due to the economic crisis. In 2015 Dutch consumers for the first time made more payments with debit cards than with cash.

Key words:

Cash usage, debit card usage, households, diary data

1. Introduction

Central banks and other stakeholders in the payments market have a need to be informed about which payment instruments consumers use at physical points-of-sale (POS) and the underlying reasons. It helps them to monitor the developments in the retail payments market, to assess the future need of cash and electronic payment instruments by consumers and retailers and to identify which factors drive changing payment behaviour. Stakeholders use this information to assess the efficiency and safety of the retail payment system as a whole and to forecast the future need of electronic payment instruments and cash. The latter is especially important for central banks as they issue banknotes and are responsible for the quality of the cash circulation.

During the past decade, the need for information about payment behaviour at the POS has become stronger in the Netherlands due to the continuing decline in cash usage, fuelled by the widespread acceptance of electronic payment instruments and the introduction of new payment methods such as contactless card and mobile payments.

This study by De Nederlandsche Bank (DNB) and the Dutch Payment Association (DPA) is the first to report and discuss the results of a longitudinal survey on consumers' payment behaviour carried out yearly during the period 2010 to 2016. We have collected data on payment transactions using single day payment diaries among a large sample of 119,117 Dutch speaking residents in the Netherlands aged 12 years and older. From 2014 onwards we have collected data during the entire year in collaboration with research company GfK. The contribution of this study to the existing payment literature is fourfold. First, it allows us to estimate cash usage on a continuous base, enabling us to track the cash by cards substitution process on a yearly base. Second, continuous data collection provides us the unique opportunity to identify seasonal patterns in payment behaviour. Third, we provide information on the differences in the cash substitution between industries and consumer segments. Fourth, due to the length of the research period, we can track the adoption of a new payment method from its introduction in the Dutch payment market among different consumer segments.

The results show a gradual substitution of cash by debit card payments from 65% in the total number of POS payments in 2010 to 45% in 2016. The substitution process had a hick-up between 2012 and 2013, probably due to the economic crisis. However, from 2014 onwards the substitution process continued. In 2015 Dutch consumers made for the first time more debit card payments than cash payments. There are clear seasonal patterns in cash and card usage. Consumers make relatively few cash and card payments in February and relatively many in May and during the summer holiday months July and August. Debit card usage is relatively high in December, but the opposite holds for cash. Debit card usage is relatively low between January and March. Teenagers and the over-75s use cash relatively often. There has been a marked increase in debit card use among all consumer segments, though growth in debit card usage was strongest among people aged 34 and younger. Regarding contactless card payments, men, young adults and highly-educated people were among its early adopters. With respect to consumer payment behaviour in different types of shops, we find that consumers have used debit cards more often in all of them with card usage growing strongest in vending, followed by the catering industry, and warehouses in home products.

One of the challenges when monitoring the usage of POS payments over time concerns accurately measuring cash usage. Unlike electronic payment instruments such as debit cards and credit cards, cash payments are not centrally registered. Researchers therefore have to rely on estimating cash usage by surveying a large representative sample of consumers. Boeschoten (1992) was the first to use payment diaries sent to households in which they could register their daily payment transactions during a month, including the amount paid and payment instrument used. Jonker and Kosse (2013) conclude that the length of the registration period influences the quality of consumers' registration of their payments negatively. Measurement errors are smallest when they do so during a single day. Recently, several researchers have employed payment diaries to estimate cash usage and its underlying drivers. However, most studies collect data once or only every three years (e.g. Deutsche Bundesbank for Germany, 2015; Henry, Huynh and Shen for Canada, 2015; Ossolinski, Lam and Emery for Australia, 2014) or use a 1-week or 1-month payment diary (e.g. Bounie and François for France, 2006; Deutsche Bundesbank, 2016; Jakobsen and Nielsen for Denmark, 2011; Ossolinski et al., 2014; The Payments Council for the UK, 2011). Bagnall, Bounie, Huynh, Kosse, Schmidt, Schuh and Stix (2016) compare cash usage among seven countries by harmonising the payment diary

surveys. They find that although the level of cash usage differs across countries, there are also similarities with respect to the factors influencing consumers' payment choice, such as transaction size, consumer characteristics and merchant characteristics.

This study proceeds as follows: chapter 2 discusses the scope, the research methodology and the samples used, as well as weighting and validation procedures. Chapter 3 describes the main findings relating to the use of cash and payment cards by consumers at the point-of-sale (POS) in the Netherlands between 2010 and 2016. In particular, it presents the use of cash and payments cards by the amount paid, by industry and seasonal patterns. Chapter 4 describes the influence of demographic characteristics on how people pay their purchases and reveals differences in the cash by cards substitution between consumer segments. Next, it discusses how much cash people hold for making POS payments, and developments therein. Subsequently, it pays attention to the adoption of contactless payments by consumers. Then it describes consumers' preferences for cash and card usage in general and in specific situations or locations. Furthermore, it discusses the extent in which consumers experience actual constraints in the way they pay. Chapter 5 summarizes and concludes.

2 Research method and sample

2.1 Research scope and research population

The aim of this study is to analyse the development of the number and value of cash payments made in the Netherlands between 2010 and 2016. In order to bring into focus the role played by cash, we also consider other commonly used POS payment instruments such as prepaid payment cards, debit cards and credit cards. Our study is limited to payments made in the Netherlands by Dutch residents over 12 years of age. As a result, the sample population from 2010 to 2016 consists of 119,117 consumers. We exclude transactions made by Dutch consumers abroad, non-Dutch speaking residents, children below the age of 12, tourists and other non-residents.

2.2 Sample

The Survey on Consumers' Payments (SCP) was carried out between 2010 and 2016 by two different research companies. Heliview Research carried out the field work during the first three years of the study. During this period the survey was held in September, a month which we considered as fairly average with respect to POS payments made by consumers. From 2014 onwards the field work has been carried out by research company GfK and has taken place during the whole year. This means that each day of the year, a group of respondents has been asked to register their payments in a diary and report about them. We have chosen to let the respondents record their payments in a diary as for just one day in order to avoid diary fatigue (see Jonker and Kosse, 2013). Respondents can participate a maximum of four times per year, with an "in-between" pause of at least three months. In practice, however, 85% of all participants only participate once a year.

The survey sample is representative for the Dutch population aged 12 years and older based on four demographic aspects: gender, age, ethnicity and education. Other items factored into the sample were region, country of origin and income bracket.

As purchasing and payment behaviour differs from day to day, the assessments were spread evenly over the days of the month. For every day of the week and every week in the month, the number of respondents was sufficiently large and representative in terms of gender, age, ethnicity, education, region, country of origin and income bracket.

Table 1 presents the number of respondents, participating in the survey each year, as well as the total number of collected payment diaries and the total number of recorded transactions. As can be seen, the annual sample size varies according to the field work method used each year: i) field work concentrated in September (2010-2013) and ii) field work distributed along the whole year (2014 onwards).

Table 1. Number of survey participants, payment diaries and transactions

Year	Sample size	# Payment diaries	# Transactions
2010	7.499	7.499	14.447
2011	7.944	7.944	15.416
2012	8.354	8.354	14.521
2013	8.707	8.707	15.350
2014	40.955	50.740	14.892
2015	20.875	29.694	49.262
2016	24.783	29.820	50.452
Total	119.117	142.758	174.340

Note: In 2014 DNB carried out an experiment to investigate panel conditioning effects due to a higher frequency of respondents' participation. For this reason, the number of respondents in the month of March accounted to 16,652 participants. Additionally, it was decided to draw a representative sample of the Dutch population to be surveyed in the month of September in order to compare results from 2014 using two field work methods: i) field work concentrated in September (as implemented during 2010-2013) and ii) field work distributed along the whole year. The results under the new field work methodology proved to be successful and did not produced a change in the trend of the number and value of payments. Therefore, it was decided to distribute the field work along the whole year for 2015 and 2016.

Since 2010, a total of 119,117 respondents have participated in the SCP. During the first three years, the sample size ranged from 7,499 to 8,707 participants per year. With the introduction of a new field work method implemented as of 2014, the sample size increased to more than 20 thousand participants per year. This allowed studying the use of cash and other payment instruments and having for the first time data from different consumption cycles present along a year.

Before deciding to implement the new field work method, DNB and the DPA carried out different checks to confirm the suitability of the new method as well as to explore beforehand a potential disruption in the trend of the number and value of payments. First, an experiment was carried out in order to explore for potential panel conditioning effects due to a higher frequency participation of each respondent. Findings show that participants' reporting behaviour does not change when they

are approached to participate in the survey up to four times per year, see Hernandez, 't Hoen and Raat (2017). Second, in 2014 it was decided to carry out the survey using both field work methods in order to be able to compare results and avoid a break in the trend of the number and value of payments. For these reasons, the sample size for this year grew to 40,955 respondents. The results under the new fieldwork method proved to be successful and did not produce a change in the trend of the number and value of payments when compared with the results coming from the fieldwork concentrated in September. Therefore, it was decided to distribute the fieldwork along the whole year for 2015 and 2016.

2.3 Research method

Although the survey was carried out by two different research companies and different field work methods, we used a unique research methodology during the whole study. The survey consisted of two parts: a 1-day payment diary and a questionnaire. The first gathered information about the characteristics of each payment or cash withdrawal carried out during the diary day. For each payment, respondents had to record the instrument used (cash, pre-paid card, debit card, credit card or other), the place of purchase (16 branches, e.g. a supermarket, street vendor, non-food retail shop, charity), the value of the purchase, and whether they were able to use their preferred payment method. For each cash withdrawal, they had to report the source (ATM, bank counter, other) and the value of the withdrawal. Usage of a diary helps respondents to register all the purchases they made during a day, also the small ones which are usually paid in cash. We have chosen to let the respondents record their payments in a diary as for just one day in order to avoid diary fatigue, see Schmidt (2011) and Jonker and Kosse (2013). The second part of the survey consisted of a questionnaire gathering information registered in the payment diary, background information on respondents' demographic characteristics as well as questions on issues that may influence their payment behaviour, for example, payment preferences, reasons to use cash or cards, et cetera.

Respondents were asked to register their payments on a predetermined day. Respondents were made clear that, even if they did not carry out any purchases on the respective day, this was still relevant information. So, respondents were asked to complete their diaries even if this was the case.

They were also asked to record the amount of money that they had on them at the start of the day, how much money they had withdrawn, and/or received during the day, and how much money they had left at the end of the day. The information was used to check whether the respondents did not forget to report any cash payments in the questionnaire.

2.4 Recruitment of respondents and data collection

A combination of web-based and telephone based methods were used for recruiting survey participants and for collecting the answers to the questionnaire. Given internet penetration is very high in the Netherlands¹, it was decided to use the internet as the main interview mode. As a result, an average of 97% of the all interviews were carried out online, the rest were carried out by telephone.

To ensure the representativeness of the findings per day of the week, Heliview and GfK drew a monthly sample of its panel and evenly distributed it over the days in the month. Days to be registered in the survey were randomly selected. In this way, the representativeness of the sample on a daily basis was guaranteed. Respondents can participate a maximum of four times per year, with an 'in-between- pause of at least three months. According to Hernandez et al. (2017), the reporting behaviour of diary survey participants does not change when they are interviewed up to four times per year.

2.4.1 Online interview mode

A combination of web-based and telephone based interview methods were used by Heliview and GfK for recruiting survey participants and for collecting the answers to the questionnaire. Given internet penetration is very high in the Netherlands, it was decided to use the internet as the main interview mode. As a results, an average of 97% of the all interviews were carried out online, the rest were carried out by telephone.

The online process from sending the invitations to participate in the survey to sending reminders to non-respondents was managed by the research companies Heliview and GfK which used similar field

¹ According to Statistics Netherlands (CBS), only 3% of the population does not have access to the internet.

work processes². Invitations to register to participate in the study were sent one week before the actual diary survey took place. This included the diary as an attachment to the email invitation which the participants were encouraged to print. The following process consisted of three key days. *Day 1*, one day before the diary survey, registered participants were reminded that the next day they should keep a diary of all their purchases; this email enclosed the diary book once again. *Day 2*, one day after the actual diary survey took place, participants received an email with a link to the questionnaire. *Day 3*, participants who failed to fill in the diary survey were reminded to do so. They had the chance to confirm once more if they wanted to keep on participating in the survey. Those who did not complete the diary given that they did not carry out any purchases, were invited to answer the questionnaire nevertheless.

2.4.2 Telephone interview mode

Heliview and GfK have a group of panelists without access to the internet who can be accessed via writing and / or telephone communication. Every week, the research companies drew a sample of these panelists to be contacted by phone. Once respondents agreed to participate, a confirmation letter, included a printed diary book, was sent by written mail. Furthermore, participants had the option to choose the day they preferred to answer the diary survey. In order to ensure representativeness by day of the week, only a limited number of respondents could choose a reporting day of the week.

2.5 Weighting and validation

Because the sample is not perfectly representative as is the case in many surveys, sample weights were needed to correct differences with the research population. The key variables used for the post-stratification adjustment were gender, age, education, ethnicity, day of the week and month. In addition, a second weighting phase was considered in order to adjust the results by the actual number and value of debit card payments as reported in statistics from the Dutch Payment Association.

² Jonker, Kosse and Hernandez (2012) provides a detailed description of the recruitment of respondents and the data collection method used by Heliview between 2010- 2012.

3. Cash and card payments in the Netherlands between 2010 – 2016

3.1 Development cash and card usage at the POS

Dutch consumers have changed the way they pay, turning the debit card into the most frequently used instrument of payment. As the use of debit card among consumers increased by on average 9% each year since 2010, the substitution of cash by cards reached its turning point in 2015. In this year, Dutch consumers made for the first time more debit card payments than payments using cash. By then, contactless payment cards were accepted by merchants and used by consumers after its introduction in 2014 following the disappearance of the Chipknip prepaid card.³

Between 2010 and 2016, the total number of cash payments has decreased by one-third, from 4,37 billion transactions to 2,95 billion, while the total value of cash payments has decreased by 27% from EUR 52 billion in 2010 to EUR 38 billion 2016. Cash remains to be primarily used for minor purchases as it used to be in 2010. However, the smallest purchases are no longer exclusively paid using cash. With the increased usage of debit card payments and the introduction of contactless cards, the average value of a cash transaction has increased by more than one euro, from EUR 11.80 to EUR 12.85.

The number of debit card payments has increased by almost one-third, from 2.15 billion transactions in 2010 to 3.57 billion in 2016. The total value, has increased by 20% from EUR 81 billion in 2010 to EUR 97 billion in 2016. The trend that consumers often pay smaller purchases with their debit card, still continues. The average transaction value has decreased by 27%, from EUR 37.56 in 2010 to EUR 27.25 in 2016.

³ Chipknip was the domestic prepaid card scheme in the Netherlands.

Chart 1a. Total number of payments (in billions)

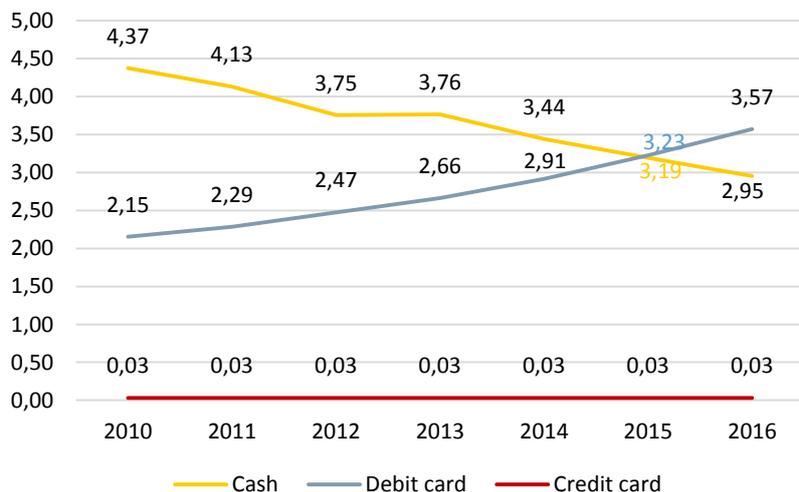
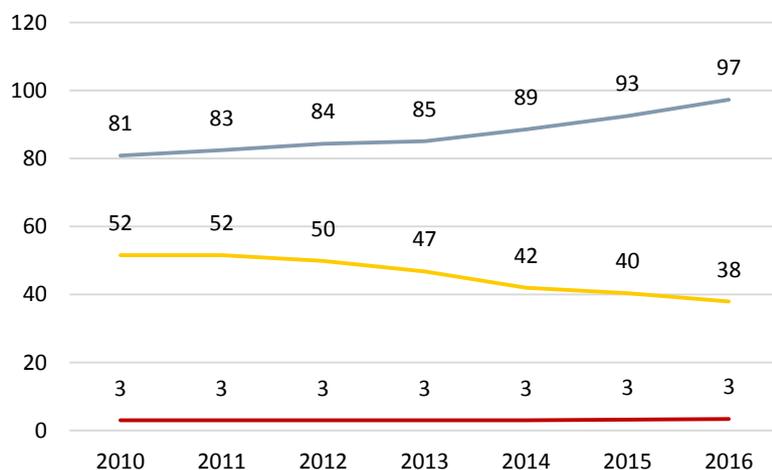


Chart 1b. Total value of payments (EUR billions)



The credit card continues to be the least popular instrument of payment in the Netherlands. Not much has changed since 2010. In terms of numbers, the number of credit card payments has remained stable at around 30 million transactions. The value, however, has increased by 12%, passing from EUR 3 billion to EUR 3.4 billion.

As shown in Chart 1a and 1b, the substitution of cash by cards seems to have slowed down during 2012 and 2013. Between these years, the number of cash payments remained still on 3.8 billion transactions. This could be due to the financial crisis which had the severest impact on households in 2013. According to Statistics Netherlands and the Netherlands Institute for Social Research, low-income households had to make larger sacrifices in 2013 than before. Household income largely determines POS payment preferences of consumers, with those on low incomes preferring to pay their purchases using cash, whereas high-income individuals favour debit card payments (see e.g. Bagnall et al. 2016; Hernandez, Jonker and Kosse, 2017).

Debit card payments in the Netherlands have become the prevalent instrument of payment at the POS during the last six years (see Chart 2a and 2b). Between 2010 and 2016, the proportion of POS payments accounted for by cash payments fell by 19.7 percentage points from 64.7% to 45.0%, whereas debit card payments climbed by 22.6 percentage points from 31.9% to 54.5%.

Chart 2a. Relative use of payment instruments: total number

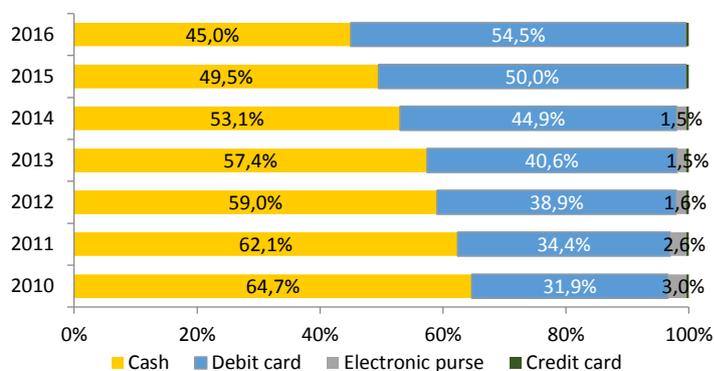
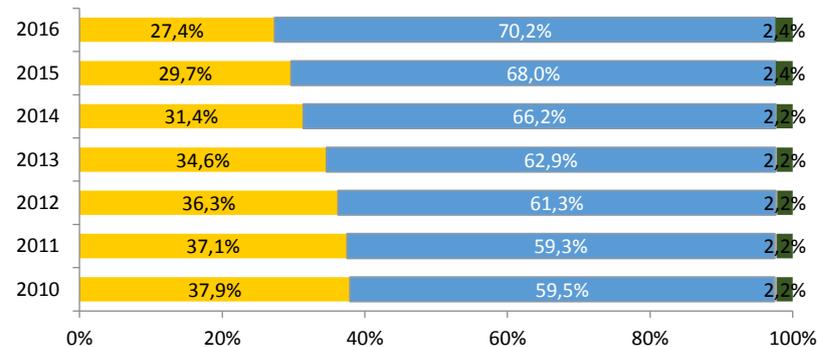


Chart 2b. Relative use of payment instruments: total value



Looking at the trend in cash payments as a percentage of the total value of all POS payments, the declining rate is large however less sharp than for the number of payments, i.e. a decline of 10.5 percentage points from 37.9% in 2010 to 27.4%. The growth in the proportion of debit card payments is comparable, from 59.5% in 2010 to 70.2% in 2016. In the last six years, Dutch consumers have not only continued using their debit cards more frequently to pay for relatively small amounts, but also started using them for the smallest amounts up to EUR 5 which are often the most frequent daily purchases i.e. for a coffee or a sandwich at a convenience store. This was possible with the introduction of contactless payments in 2014, allowing consumers to make payments by briefly holding their debit card or smartphone against a POS terminal. Consumers do not need to enter a PIN code when using their contactless cards for amounts up to EUR 25, which makes it a very fast and convenient payment method for small purchases.

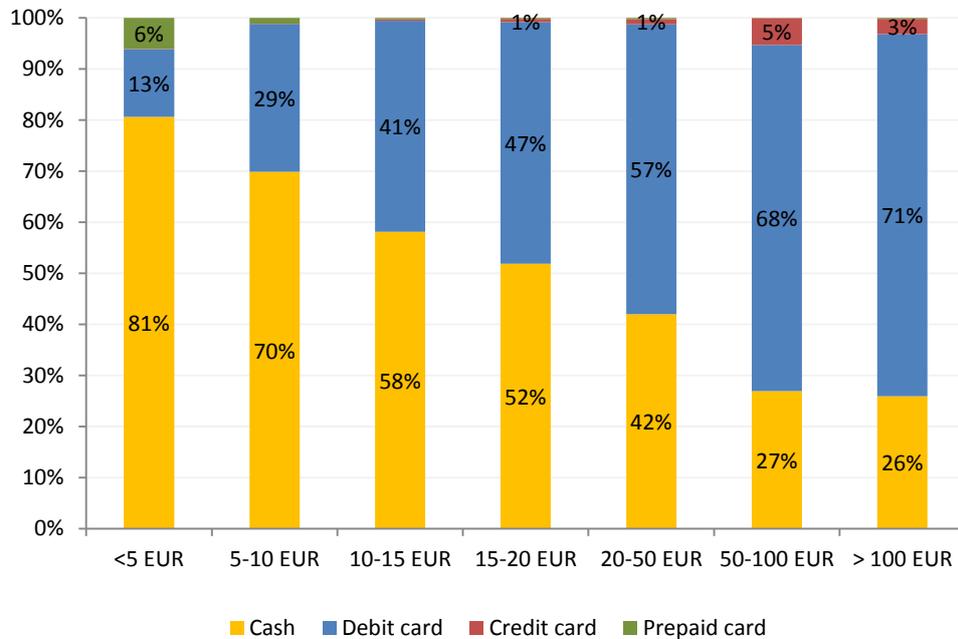
After the first year of the introduction of contactless cards, the total number of contactless payments increased by more than sixteen times, from 8 million transactions in 2014 to 135 million transactions in 2015. Between 2015 and 2016 the number of contactless payments quintupled to 630 million. One third of all contactless payments in 2016 (34 %) were for amounts under EUR 5.

3.2 Use of cash and cards by the amount paid

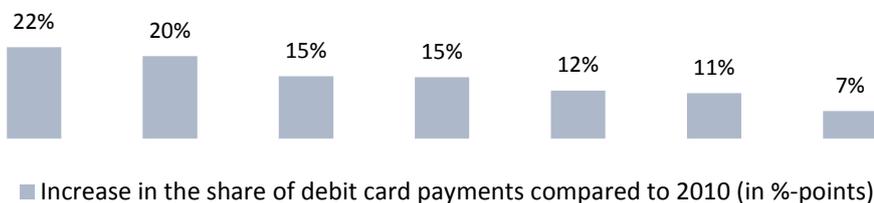
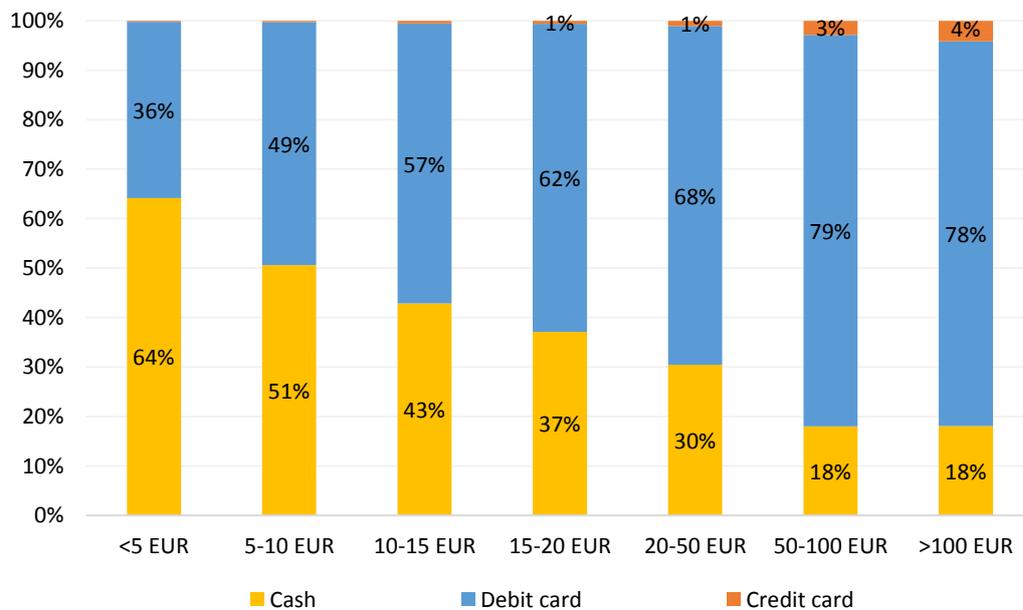
Although on average the proportion of POS payments accounted by debit card payments climbed, the rise in debit card usage varies by the transaction amount. Chart 3 shows the share of debit card payments has increased for all ranges of transaction values in the last six years. However, the substitution of cash by debit card has been highest for low value payments up to EUR 10. In 2010, consumers used to pay the large majority of their purchases up to EUR 10 using cash. In 2016, they mainly used cash for their purchases up to EUR 5; for purchases between EUR 5 and EUR 10 they used cash almost as often as the debit card and for purchases above EUR 10 they preferred to use the debit card.

In six years' time, debit card payments as a proportion of aggregate payments up to EUR 5 increased by 23 percentage points from 13% to 36%. On the other hand, the share of cash fell 17 percentage points for transactions up to EUR 5 from 81% to 64%.

Chart 3. Use of payment instruments, by amount
2010



2016



■ Increase in the share of debit card payments compared to 2010 (in %-points)

3.3 Use of cash and debit card by market segment

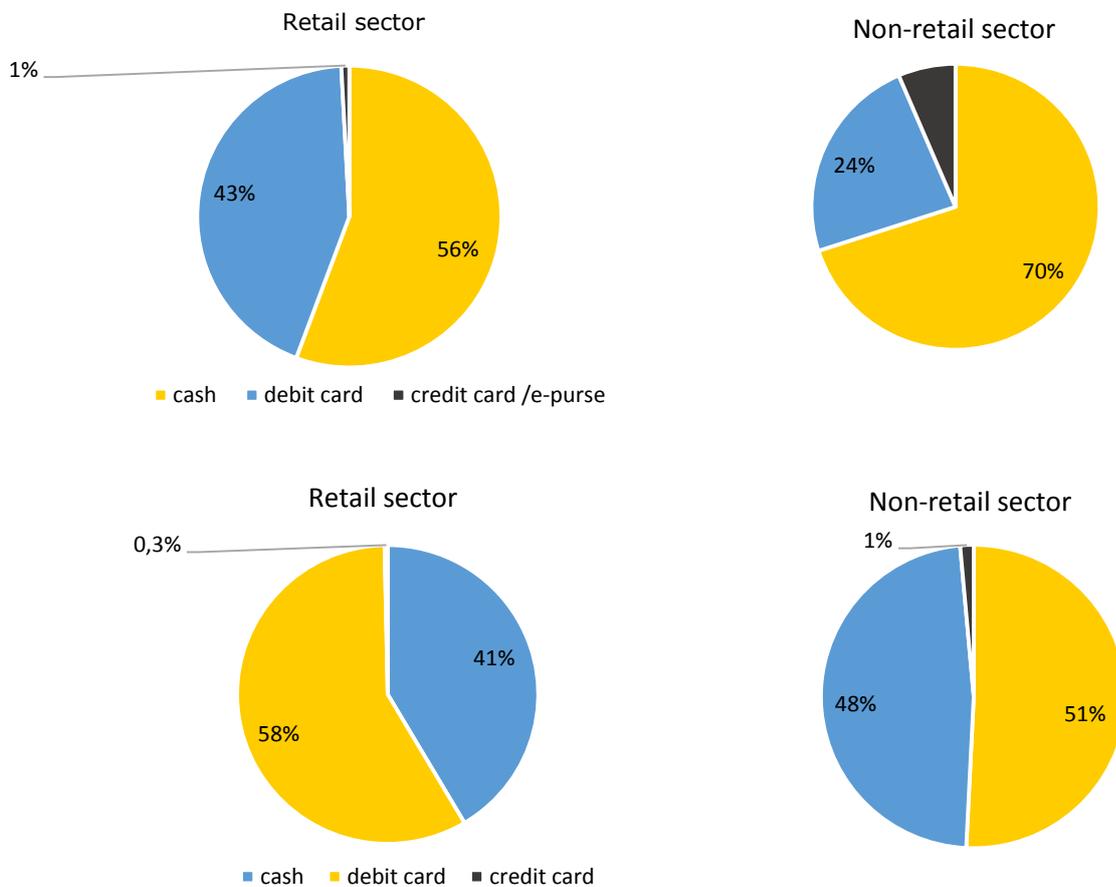
Consumers taking part in the study also specified the market segments in which they spent their money. Chart 4 shows the breakdown of all payment instruments in the retail and non-retail sectors. The retail sector holds 64% of all POS payments in terms of numbers.⁴ It is composed by sectors as supermarkets, grocery shops, department stores, among others. The non-retail sector holds 36% of all POS payments and is composed by sectors as the catering industry, service providers, vending machines, petrol stations and others.

Given its size, developments in the retail sector have a strong impact on the share of cash and cards on all POS payments. By 2010, the total share of debit card payments in this sector accounted for 43% of all payments. By then, a number of policies had already been implemented by banks and retailer organisations with the objective of increasing card acceptance among merchants as well as card usage among consumers for efficiency and safety reasons. Among other, they launched a long-term campaign in 2007 to encourage consumers to pay with debit card rather than with cash, also in case of small amounts (for a description, see Jonker, Plooij and Verburg, 2015). Since 2010, the share of debit card payments in this sector increased on average 2.5 percentage points per year. In 2016 debit card payments reached a 58% share of all payments carried out in the retail sector. On the other hand, the share of cash payments fell from 56% in 2010 to 41% in 2016.

Although the non-retail sector at the POS is proportionally smaller than the retail sector, it has played an important role in the ongoing substitution of cash by payment cards. The share of debit card payments in the non-retail sector has increased faster than in the retail sector, i.e. by on average 4 percentage points a year, passing from 24% of all transactions in 2010 to 48% in 2016. The share of cash payments declined by 19 percentage points from 70% of all payments in 2010, to 51% of them in 2016.

⁴ This study considers a wide range of segments from the retail and non-retail market sectors operating at the POS only. We have grouped them in up to 16 categories with the purpose of making the survey as understandable as possible for respondents. However, it should be borne in mind that some segments have been grouped in the 'other' category due to their limited size.

Chart 4. Share in numbers cash and card usage, by sector, 2010 and 2016

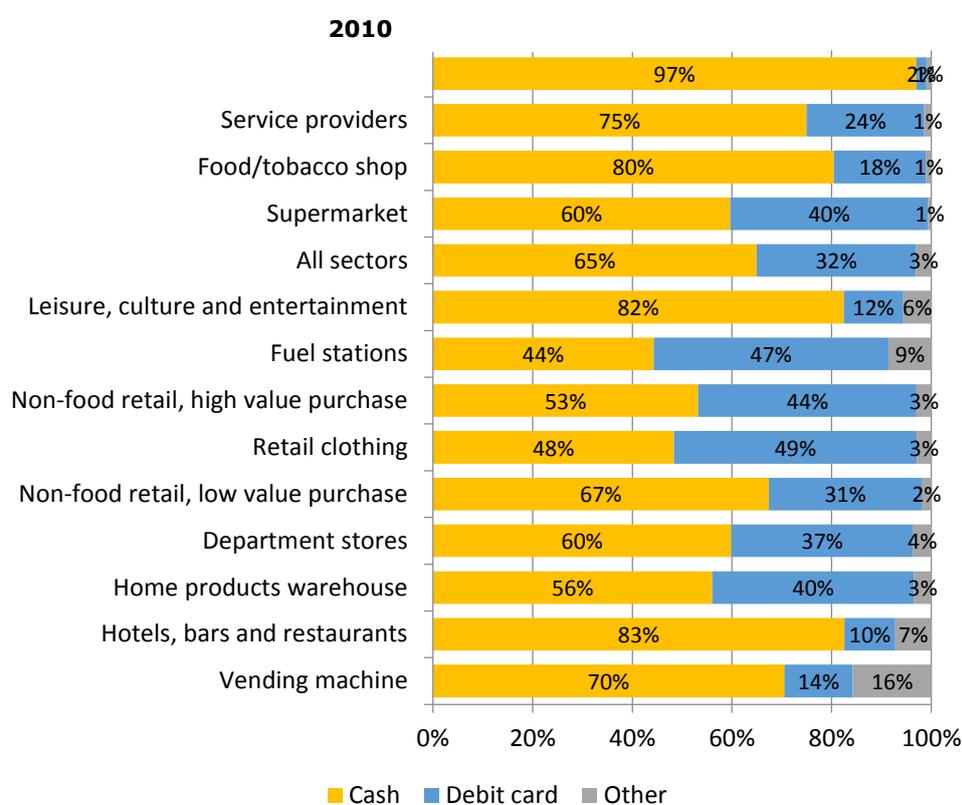


Charts 5 shows the relative use made of cash and debit cards by market segment in terms of numbers of payments in 2010 and 2016, as well as the growth in debit card usage within a sector between 2010 and 2016. Please note that the Dutch have made most debit card payments in terms of numbers in the supermarkets, which account for one-third of all POS purchases. In 2016 consumers paid 42% of their grocery purchases using cash and 58% using the debit card. Cash usage was relatively high in street vending (86%), the recreation and cultural sector (64%), food, tobacco and liquor stores (63%) and service providers, whereas debit cards were the dominant means of payment in segments like retail clothing (75%), petrol stations (72%) and home product warehouses (70%).

Between 2010 and 2016 the share of debit card payments has increased the most in market segments such vending machines (+ 52 percentage points), hotels, bars & restaurants (+ 34 percentage points) and home products warehouse (+ 30 percentage points). The former two belong to the non-retail sector and have traditionally been known as cash-intensive market segments.

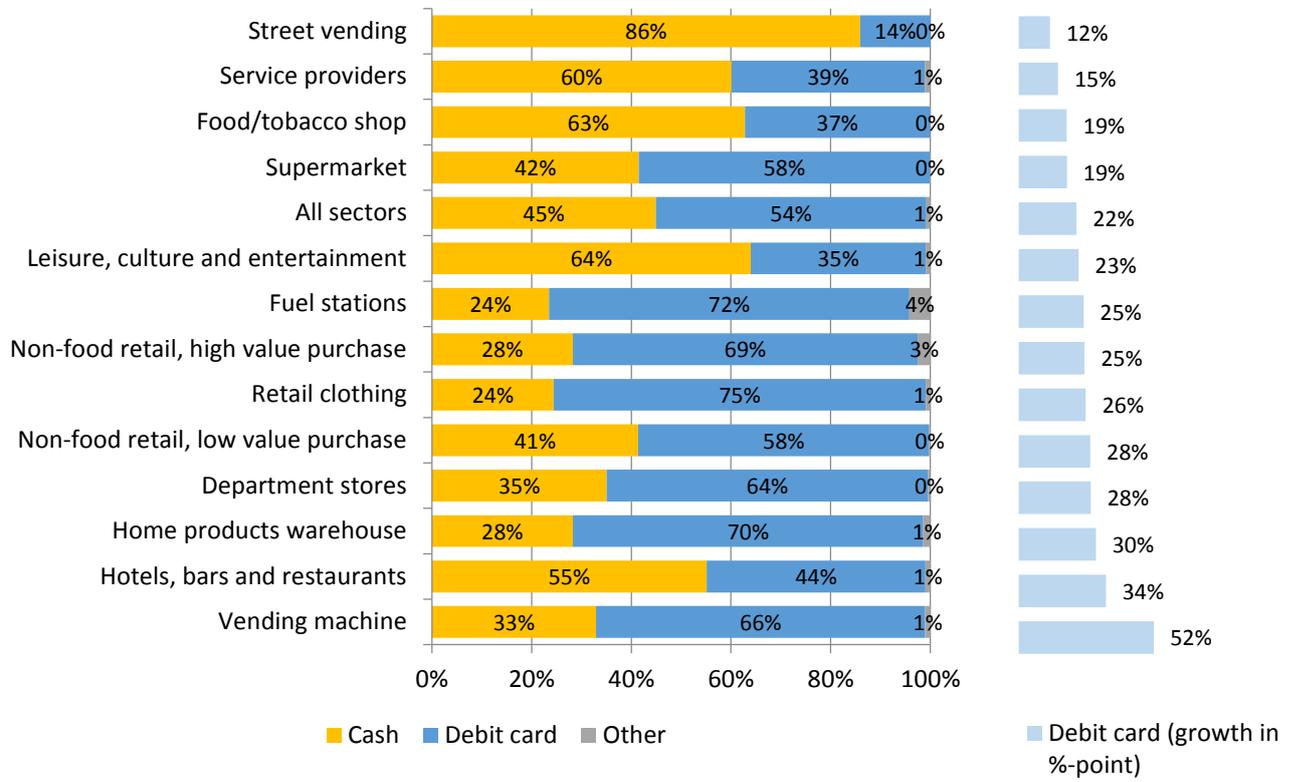
However, changes in payment infrastructure⁵, increased cost efficiency for merchants (Panteia, 2013), modification of vending machines to accept debit cards as well as the introduction of contactless payments have resulted in a wider acceptance of debit card payments, increased card usage and consequently a higher share of debit cards as compared to cash.

Chart 5. Relative use of payment instruments by market segment



⁵ Faster POS terminals, introduction of contactless terminals and mobile POS terminals (m-pos)

2016



3.5 Seasonality

From 2014, we have collected payment diary data on all days of the year, which enabled us to examine seasonal patterns in payment instrument usage. Consumers' payment behaviour is affected throughout the year by many factors such as holidays, weather, holiday bonuses and thirteenth-month pay packages. Chart 6a and 6b show seasonal patterns in cash and debit card usage. They depict the relative deviation in the number of cash respectively debit card payments compared to the annual average.

Chart 6a. Relative deviation of monthly cash payments compared to the annual average, 2014-2016

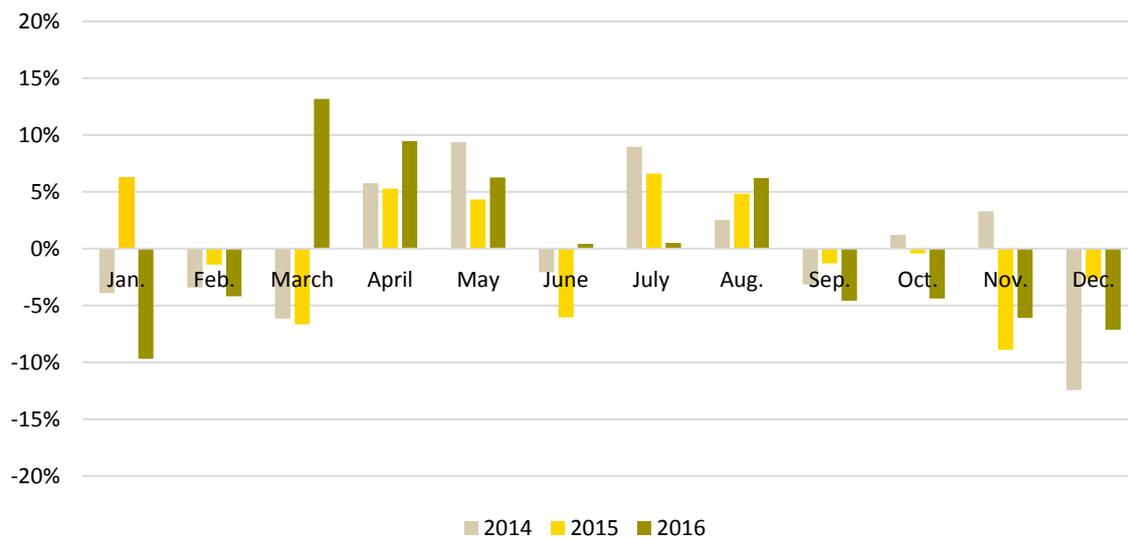
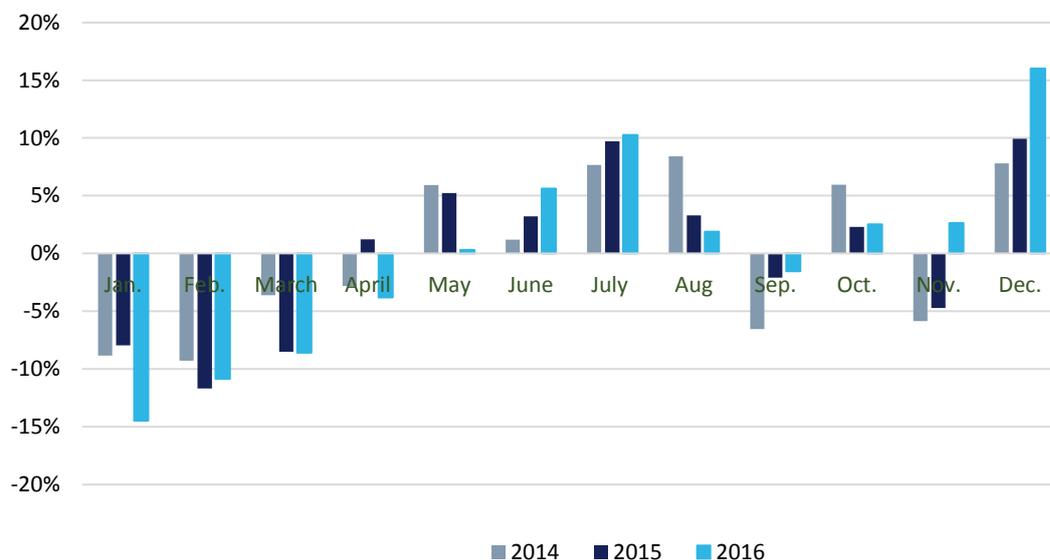


Chart 6b. Relative deviation of monthly debit card payments compared to the annual average, 2014-2016



In 2014, 2015 and 2016, consumers made relatively few cash payments in February (limited number of shopping days), September and December and relatively many cash payments in April, May and August. They also seem to make relatively few debit card payments between January and March, and relatively many in the summer holiday period. Moreover, the summer holiday period is the only period of the year in which Dutch consumers carry out relatively many payments in general. This holds for both cash and debit card payments. As expected, the vast majority of consumers carry out most debit card payments in December, during the festive period when larger purchases are carried out.

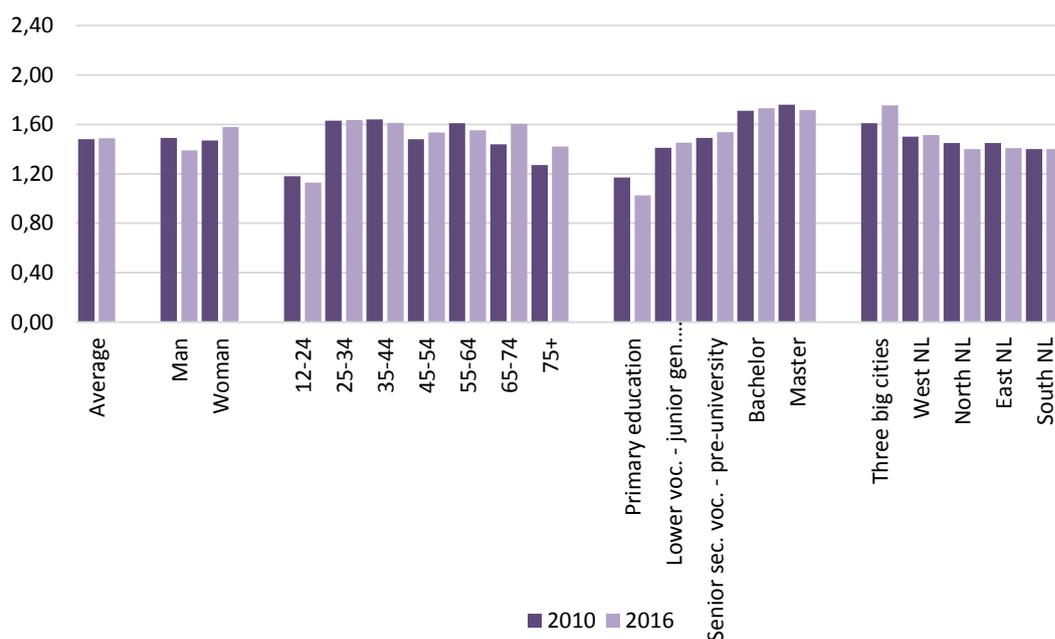
Chapter 4 Who pays how?

4.1 Number of daily POS payments

In 2016, the Dutch made on average about 1.49 payments at points-of-sale per person per day, which corresponds with about 10 POS payments a week. The number of POS payments have hardly changed. In 2010, they made almost the same number of payments a day, i.e. 1.48 payments per day.

The total number of POS payments differs by gender, age, education but also the region of residence. As chart 7 shows, in 2016 women made more purchases than men (1.58 purchases as opposed to 1.39 purchases per day respectively). People aged between 25 and 45 and people who have just retired (65-74 years) made the most purchases, i.e. about 1.6 payments a day, whereas teenagers and young adults (12-24 years) make the least, i.e. less than 1.2 payments a day. Also educational level matters, the higher one's educational level, the more POS payments (s)he makes. This probably stems from the positive correlation between education and income. The region of residence also appears to influence consumers' purchasing behaviour: people living in the three largest cities in the Netherlands made more payments a day compared to the rest of the population.

Chart 7. Average number of POS payments per person per day, 2010 - 2016



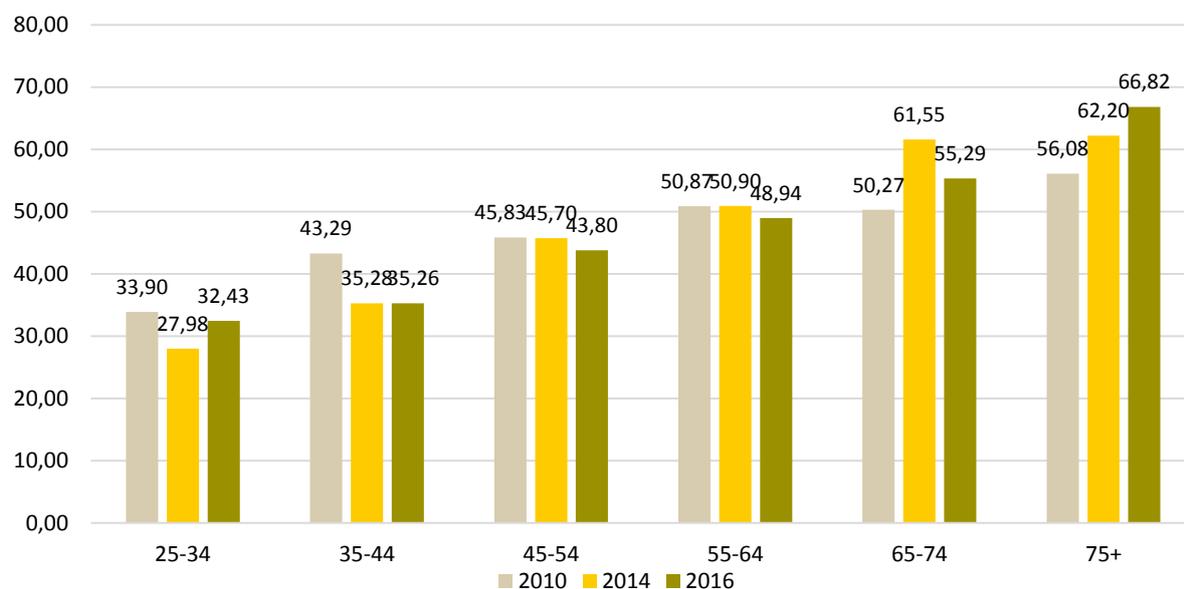
Overall, the number of POS payments made per day has remained fairly stable between 2010 and 2016. However, there are some exceptions. Women make more payments than in 2010, while men make less. Furthermore, elderly people (65+) make more payments in 2016 than six years ago, whereas the number of POS payments made by people in other age categories has remained stable. We also see that people with the lowest educational level (primary education) make less payments than in 2010, and that the number of payment made by people living in one of the three major cities have increased from 1.61 to 1.76 purchases per day.

4.2 Cash holdings

In 2016, Dutch consumers on average carried EUR 40.59. In 2010 and 2014 the average amount of cash in the wallet also hovered around EUR 40. So, despite the declining usage of cash by the Dutch at the POS, the amount of cash in their wallets has remained fairly stable. However, we see a modest increase in the share of people who do not carry any cash on them. In 2016, 9% of all consumers did not carry any cash with them, while in 2014 this share was 8% and 7.5% in 2010.

The amount of cash that consumers have with them increases with age. In 2016, people over 75 carried an average of EUR 66.82 in cash with them, while people aged between 25-34 had around EUR 32.43 with them (Chart 8). With the exception of the over 75s, the amounts of cash carried have declined in the past few years for most age groups over 35.

Chart 8. Cash in wallet, 2010 -2016



4.3 Relative usage of cash and cards at the POS

The increased use of debit cards in 2016 compared to 2010 is evident in all demographics groups. On average, in 2016 Dutch consumers paid 55% of their payments with debit cards, but this does not apply to all demographic groups. Of all the groups, consumers between the ages of 25-34 made relatively least cash payments (33% of all their POS purchases) and relatively most debit card payments (66%).⁶ Children aged 12- 18, people over 65 and people with a lower educational level use cash the most, i.e. in two-thirds of their POS purchases.⁷

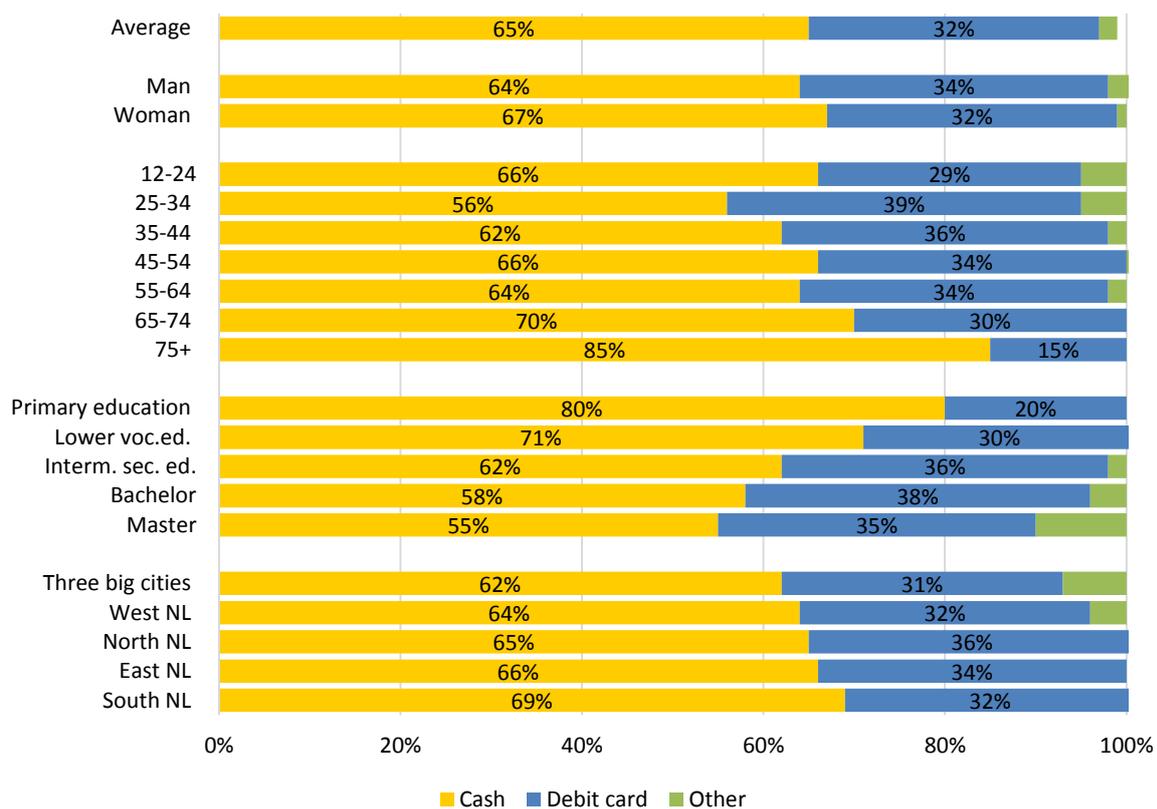
Compared to 2010, debit card use has increased the most among young people aged 12-34, from 29% of their POS payments to 56% (youths and young adults 12 – 24) and from 39% to 66% (people aged 25-34). In terms of educational level the largest increase in debit card usage is among college graduates, from 35% to 64% of their POS payments. As in previous years, gender appears to have virtually no influence on changes in payment behaviour. Men made 55% of all their POS payments with debit cards and women 54% in 2016, while in 2010 men used the debit card in 34% of their purchases and women 32%.

⁶ In 2010 we could not distinguish yet between youth aged 12-18 and young adults aged 19–24. For reasons of comparability we show the payment behaviour of youth and young adults together in Chart 9. However, please note that in 2016, young adults made relatively many debit card payments, i.e. 68% of their POS payments was paid using the debit card.

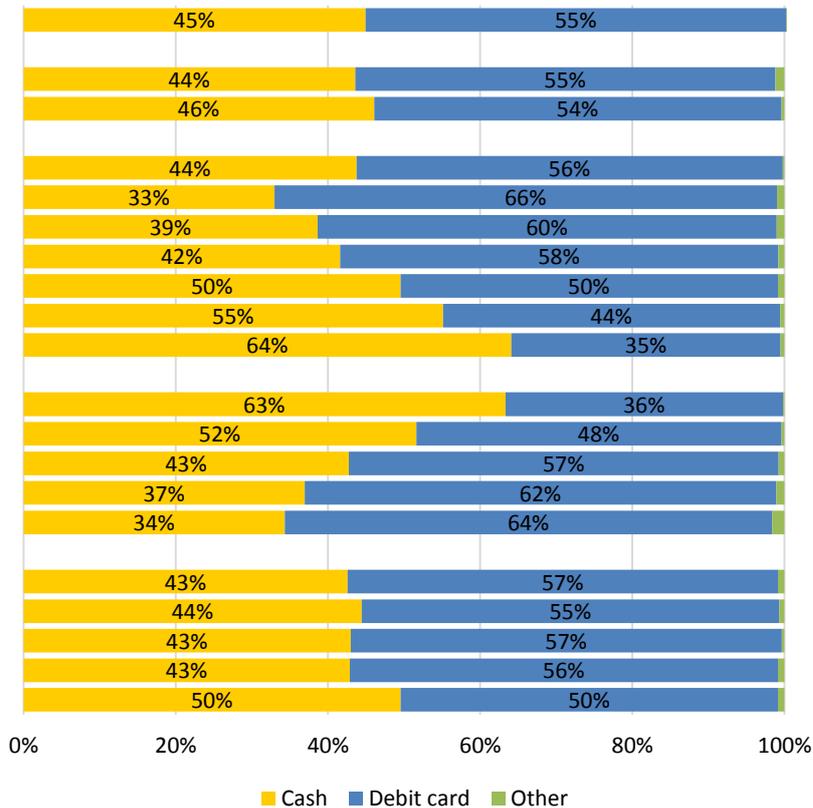
⁷ In 2016, children (12-18 years old) made relatively many cash payments, i.e. 61% of all their POS payments.

Chart 9. Usage of POS payment instruments, by demographic characteristics, 2010 - 2016

2010



2016



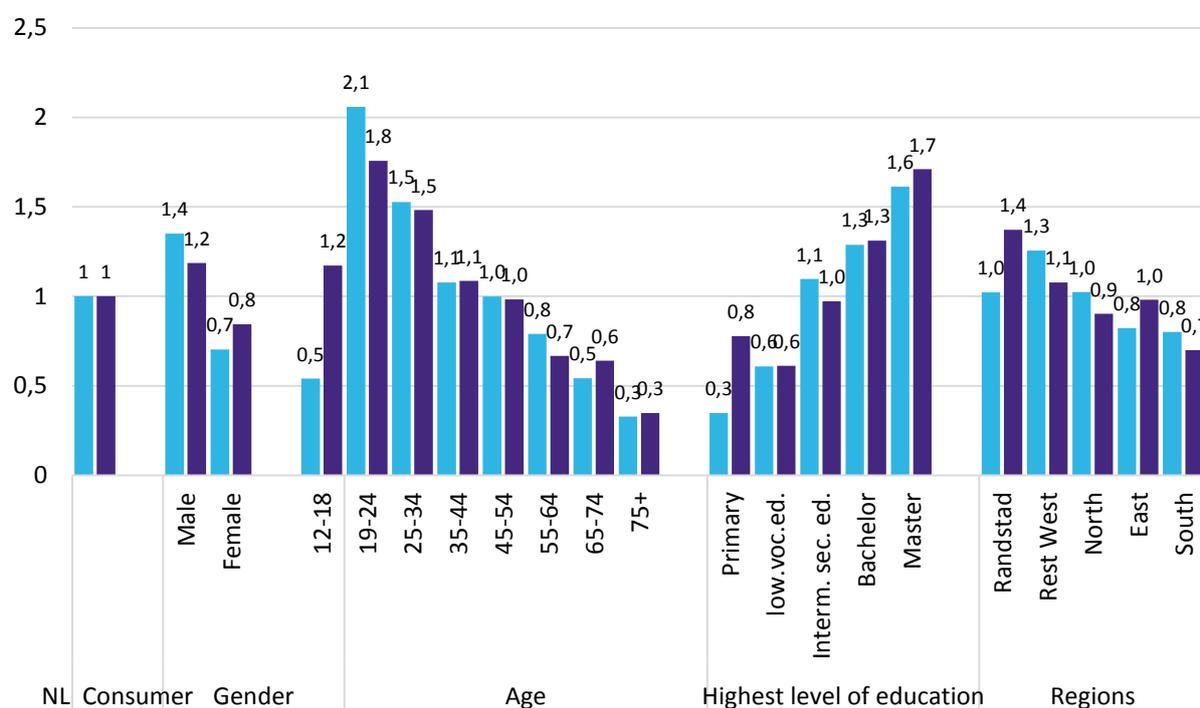
4.4 Who uses contactless payment instruments?

In 2014 contactless payments were introduced in the Netherlands. In that year the use of contactless payments was still limited, at just under 8.3 million payments. In 2015 consumers made a total of almost 135 million contactless payments. There was a strong increase in the number of payments in 2016, to approximately 630 million. Chart 10 provides an indication of the adoption of contactless payments by consumers over time. It depicts how intensively certain demographic groups make use of contactless payments compared to the average consumer. The figures in the chart represent the extent to which consumer segments groups make more or less use of contactless payments compared to the average Dutch consumer, which is represented by 1.

With respect to the adoption of contactless payments we see a pattern which is quite common for early adopters of innovations with respect to their age, gender and educational level. The adoption

of contactless payments in 2016 depends on gender, age, educational level and place of residence. Men make relatively many contactless payments, almost 20% more than the average consumer, while women make relatively few contactless payments, about 20% less than the average consumer.

Chart 10. Relative use of contactless payment by gender, age, educational level and region



Also, young adults, aged 19-24, make relatively many contactless payments compared to the average consumer (+80%), as well as the college educated (+70%) and people living in one of the three largest cities in the West (+40%). Children (-50%), people over the age of 65 (-40% or more) make relatively few contactless payments.

In general, the differences in the adoption of contactless payments between demographic groups shrank between 2015 and 2016. In 2016, the share of contactless payments in total POS payments by men was 1.5 times that by women, whereas it was twice this share in 2015. People with only primary education are clearly catching up as well from -70% to -20% of the average consumer. Also

in other demographic groups the differences in contactless payment usage are narrowing down. However, for the over 75s, the use of contactless payments remains relatively low.

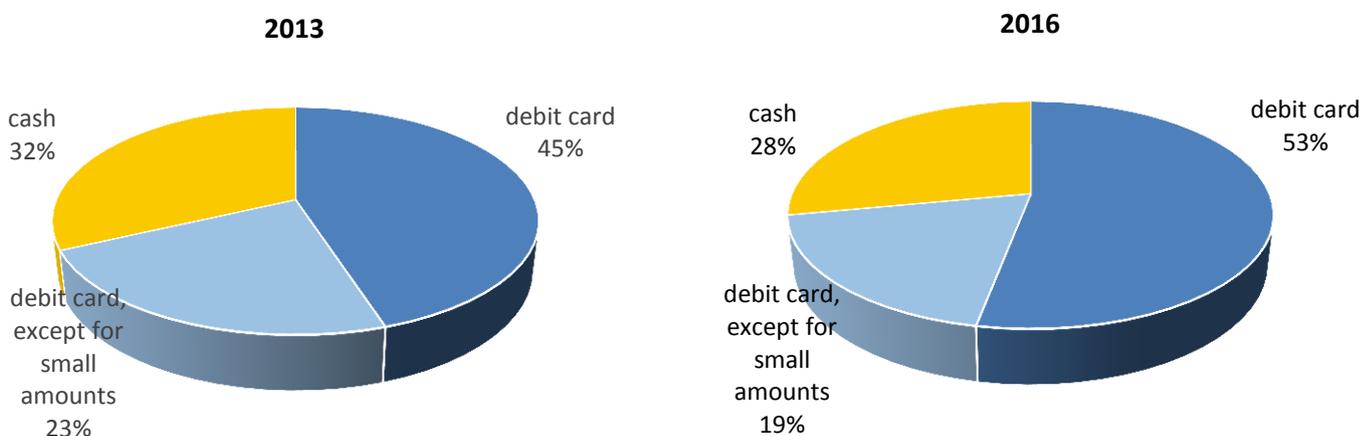
At the regional level there are some shifts, indicating that regional differences in the use of contactless payments have risen. In 2016, the use of contactless payments was relatively high in the three largest cities in the west of the Netherlands (+40%), while it was on average in 2015. Residents living in the east of the Netherlands made relatively little use of contactless payments in 2015 (-20%), but about equal in 2016. People in the west (the three largest cities excluded), north and south of the Netherlands showed a different picture. In the latter two regions, consumers on average made fewer contactless payments than the average Dutch consumer in 2015, and this difference increased between 2015 and 2016.

4.5 General payment preferences

Respondents were asked in 2013 and in 2016 which means of payment they prefer to use at the POS: cash or debit card. Chart 11 shows that in 2016 most Dutch consumers (72%) prefer using their debit card for payments at the point of sale, with 53% favouring debit cards for all payments and 19% only for the 'larger' payments (over EUR 5). The general preference for debit card has grown in the last three years with 8 percentage points. This is partially at the expense of a preference for cash, which has dropped from 32% in 2013 to 28% in 2016.

Although there has been a shift in the preferred way of paying from cash to debit card, the reasons for the preference are generally the same. Reasons most given for the preference of debit card are speed (73%), always having enough money at hand (71%) and it being a habit (70%). Cash is still most preferred because of budget reasons; seeing what's still in the wallet (and what not) helps people keeping track of their spending (82%). Other frequently mentioned reasons for preferring cash are that it is a habit (68%) and that the payment feels 'more real' with cash than with debit card.

Chart 11. Payment preference, 2013 vs 2016



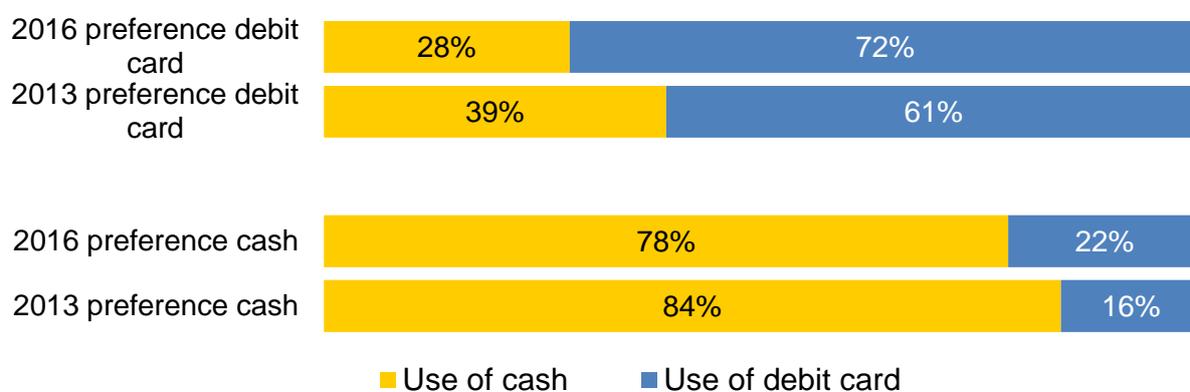
One fifth of the Dutch consumers have a general preference for debit card, but prefer to pay small amounts (up to 5 euro) using cash. Like in 2013, the main reason for this difference in preference is the idea that using a debit card is too much effort for small amounts. Paying cash feels easier and faster (71%). For other people, it is a good way to get rid of their small change (64%). Compared to 2013 less people give as reason that they think the debit card is inconvenient for the retailer (25% in 2013 vs. 21% in 2016). This might be the result of the public campaign ‘Klein bedrag, pinnen mag’ (best translated as: small amount, please use your debit card), aimed at letting people know that most retailers prefer debit cards for all amounts, including small amounts.

4.6 Payment preference versus use

Consumer preference for payment methods is often not in line with actual use of payment methods at the point of sale. For example, consumers who expressed a general preference for debit cards still paid 28% of their purchases in cash in 2016. The reverse is also true; those with a general preference for cash paid 22% of their purchases with debit cards. 121 research (2010) show that actual payment behaviour of the Dutch is determined not only by preference, but also by situations, locations and constraints. This explains part of the difference in actual debit card usage and the preference to pay by debit card, with people using cash more often than they actually think. In addition, according to Cruijssen, Hernandez and Jonker (2016) the way people pay is for a large part based on habits, which are also determined by circumstances.

As shown in Chart 12 the gap between preference and use has become smaller in the last three years. The share of debit cards made by people who prefer debit cards increased by 11 percentage points, from 61% in 2013 to 72% in 2016. Remarkably, people with a preference for cash also paid a larger part of their transactions with debit card, although this increase is limited.

Chart 12. Preferred vs used payment instrument, 2013 vs 2016

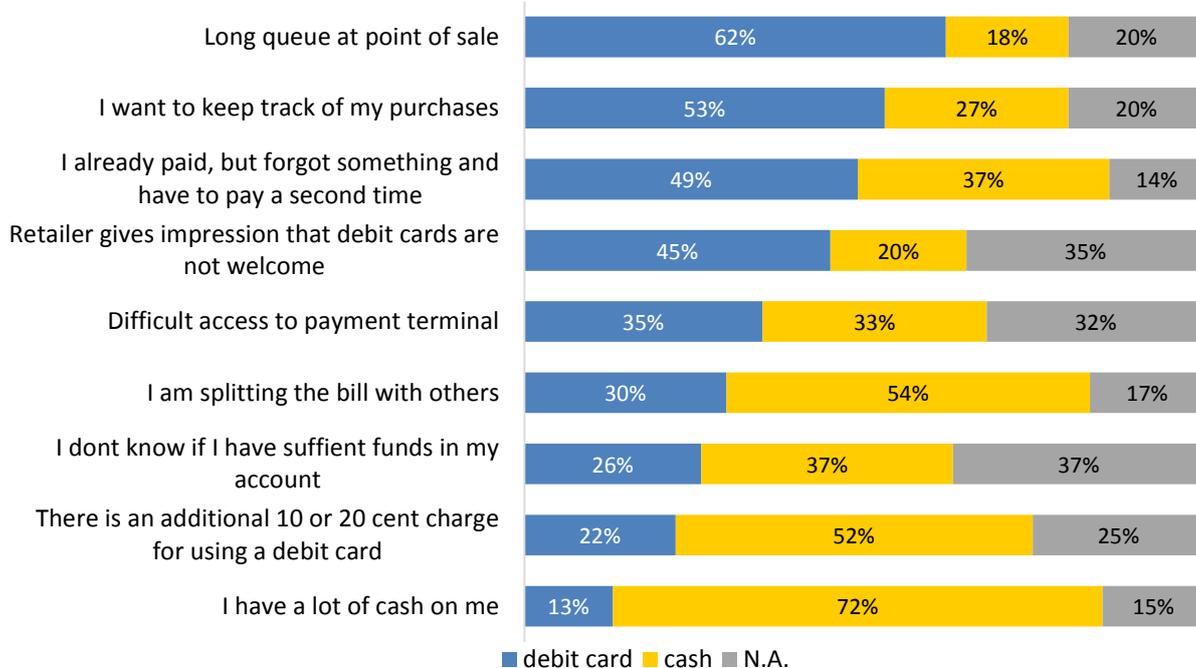


4.6.1 Payment use in different situations

When consumers were asked how they would pay in various situations, it appears that their preferences depend to some extent on the circumstances. For example, if there is a long queue at the point of sale, or when people want to keep track of their purchases most of them prefer to pay by debit card. However, if consumers have large amounts of cash on them or are required to split the bill with other people, over half would choose to pay by cash.

Most situations have become less of an influence in the last three years. Some more than others. For instance, compared to 2016, more people would pay with cash in 2013 when they forgot something and had to pay a second time (+9 percentage points), when they had to pay 10 or 20 cent extra for using a debit card (+8 percentage points) or when splitting a bill with others (+7 percentage points).

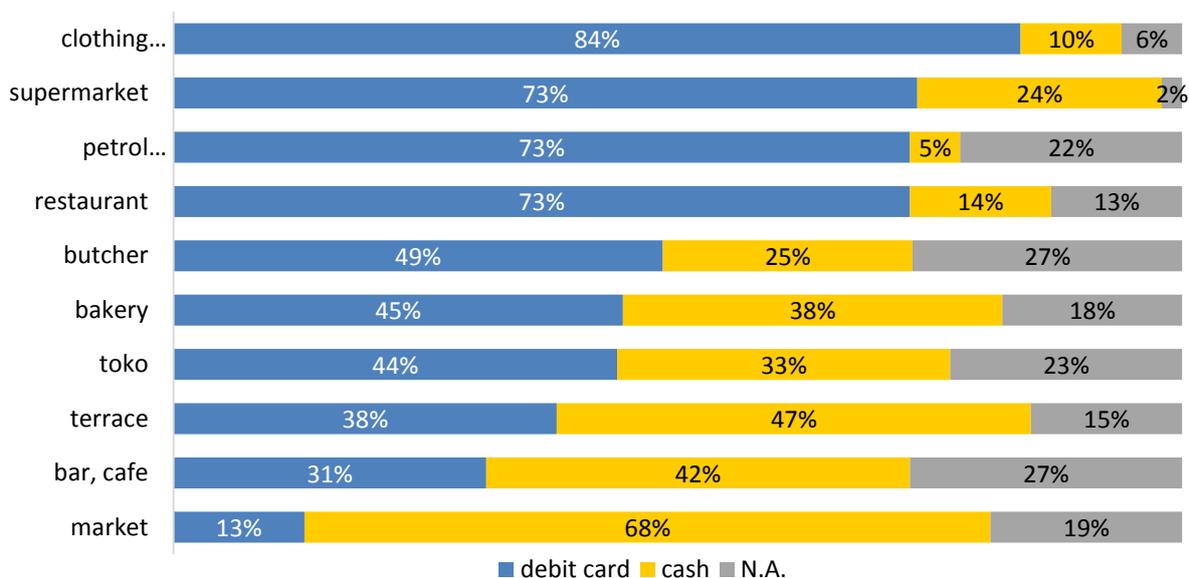
Chart 13. Payment use in different situations, 2016



4.6.2 Payment use at different locations

The use of payments methods does not only depend on the situation, the location of the payment is also determinative. As shown in Chart 14 consumers are more inclined to pay with debit card at the supermarket than at the butchers or the bakery. And more likely to pay with cash at the market or the bar. Although these differences are still considerable, they have decreased in the last three years. The share of debit cards especially increased at the terrace (+12 percentage points), the bakery (+11 percentage points), the bars (+11 percentage points), the butcher (+9 percentage points) and the toko (+8 percentage points).

Chart 14. Payment use in different locations, 2016



4.6.3 Constraints for paying the preferred way

In some cases people experience actual constraints when they want to pay a certain way at the point of sale. Although relatively low in share, the number of transactions paid differently is considerable (80.5 million transactions in 2016). The number of transactions paid differently than preferred decreased in the last few years. In 2010 2.7% of all cash transactions would have been paid with debit card if that was possible, versus 1.6% in 2016. The reasons most often mentioned by consumers for not paying cash when they wanted to are the fact that they didn't have enough cash at hand or a lack of acceptance on the specific point of sale. With debit cards the number of constraints experienced dropped even more, from 2.1% in 2010 to 1% in 2016. Probably, increased debit card acceptance by retailers and less failures in the debit card payment chain resulted in less people being hindered to pay with the debit card (NFPS, 2017; Dutch Payments Association, 2016).

5 Concluding remarks

Between 2010 and 2016 consumers' payment behaviour at the point-of-sale has undergone large changes in the Netherlands, with the debit card gradually taking over the role of cash as dominant means of payment. In this study, we present and discuss the outcomes of a longitudinal survey on consumers' payment behaviour carried out during the period 2010 to 2016. We have collected data among Dutch consumers aged 12 years and older using single day payment diaries.

The results reveal a gradual substitution of cash by debit card payments, with 2015 being the year in which the number of debit card payments exceeded the number of cash payments for the first time. In 2010 65 percent of the POS payments were effected using cash and 32 percent using the debit card, while in 2016 consumers paid 45 percent of their purchases using cash and 55 percent using their debit card. In terms of value cash and the debit card represent 27 percent respectively 70 percent of the value of all POS payments.

Regarding payment behaviour in different sectors, we find that consumers have used debit cards more often in all of them, with growth in card usage being strongest in vending, the catering industry, and in ware houses for home products.

Collecting payment data 365 days of the year allows us to examine seasonal patterns in cash and card usage. Debit card usage peaks in December, but the opposite holds for cash usage. During the first months of the year, consumers make relatively few (cash and) card payments, maybe in order to compensate for the expensive December month. They make relatively many cash and debit card payments in May and during the summer holiday season.

In 2016 debit card usage is highest among people aged between 19 – 34 years old and among people with a college education, whereas people with at most primary education or who are aged 75 or older are among the most intensive cash users. The growth in debit card usage has been widespread. It was highest among people aged 34 and younger, but also card usage by the elderly grew considerably being twice as high in 2016 than in 2010. In 2014 contactless payments were introduced in the Netherlands. Men, young adults and highly-educated people were among its early

adopters. However, the differences in usage between consumer segments is narrowing down rapidly.

Given the ongoing substitution of cash by debit cards, fueled by increased debit card acceptance, the successful adoption of contactless payments in 2014 and recent innovations such as payment apps, we expect that the usage of debit cards and other electronic means of payments will continue to rise and substitute for cash payments in the next decade.

From a social perspective the continuing substitution of cash by debit cards is beneficial. It is conducive to the safety in retail trade as retailers will have less cash in their premises, making them a less attractive target for criminals. In addition, it stimulates the higher cost efficiency in the POS payment systems as debit card payments are usually less costly for retailers and banks than cash payments. However, it is also important from both an accessibility as well as a financial stability point of view that it should remain possible for consumers to pay their purchases at the POS using cash. Some consumers have a clear preference for cash, as they do not have access to a debit card (yet), or experience difficulties in using it. This holds in particular for vulnerable consumer segments such as the visually impaired, people who choose to use cash to control their spending, and many children. Moreover, the resilience of the POS payment system is best served if cash remains available as a reliable alternative next to the electronic payment system in case of technical failures.

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