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

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# Gender gaps in the world of payments\*

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## Abstract

Gender gaps are widespread. The world of payments is no exception, as our research using novel survey data from Dutch households shows. First, we find that men are more likely than women to have experienced paying with a credit card or contactless via their smartphone or smartwatch. Differences in digital literacy and attitudes towards new payment instruments lie at the heart of these gender gaps, with men expressing higher levels of digital literacy and greater enjoyment when trying out new payment instruments. Second, our research shows a division of payment tasks within households. For example, men are more involved in paying housing-related costs, while women tend to be in charge of grocery payments. Finally, women have poorer payment fraud knowledge and express more fear of the digital world. Our research underscores the importance of policies aimed at improving digital literacy and fraud knowledge, especially among women.

**Key words:** payments; gender gap; inclusion; fraud knowledge; digital literacy

**JEL codes:** D12; D83; G50; J16; J33

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## 1. Introduction

Our world is full of gender gaps. Many of these gaps are innocuous and the result of physiological and biological differences. For example, the world record for the 100-metre sprint is 9.58 seconds for men (Usain Bolt) and 10.49 seconds for women (Florence Griffith-Joyner), a gap of less than a second. Unfortunately, there are also harmful gender differences. Numerous studies focus on gender gaps in the economic context. To name a few of these gaps, women earn less money than men (Blau and Kahn, 2017), are less likely to have a bank account (Demirgüç-Kunt et al., 2022) and participate less often in the stock market (van Rooij et al., 2011; Ke, 2021). Moreover, women exhibit lower levels of financial literacy than men (Bucher-Koenen et al., 2017; Aristei and Gallo, 2022; Lusardi and Streeter, 2023). This is worrisome because financial literacy matters for financial decision making. To illustrate, women with higher levels of financial literacy are more likely to plan for retirement and are more successful retirement planners (Lusardi and Mitchell, 2008). Retirement planning is a strong predictor of wealth accumulation (Lusardi and Mitchell, 2007). Lind et al. (2020) show that women feel less secure in their financial situation compared to men. Moreover, this research shows a significant difference in financial behaviour between genders, with women being more likely to engage in sound financial behaviour after controlling for sociodemographic and cognitive measures. However, women feel more anxiety about financial matters compared to men. The utilisation of financial products, including payment services, can contribute to fostering inclusive growth and promoting economic development (Demirgüç-Kunt et al., 2017). To date, however, only little is known about gender gaps in the world of payments. For example, do disparities exist between men and women in their use of digital payments, and how can this be explained?

Expectations are high that new financial technologies will improve financial inclusion. However, digitalisation may also hinder access to financial services if it is accompanied by a deterioration in non-digital services. A study in the Netherlands has shown that 1 in 6 people struggle with the digital world of payments (Broekhoff et al., 2023). Tok and Heng (2022) show that greater use of fintech did not affect the gender gap in access to financial services. Chen et al. (2023) use survey data on 28 countries and identify a fintech gender gap. They conclude that one of the explanations why women are less likely to use fintech products and services is the gender difference in willingness to use financial technology. Klapper and Singer (2014) state that use of digital payments can increase the economic empowerment of women and thereby financial inclusion.

This paper contributes to the literature on consumer payment behaviour by focusing on the gender angle of payment choice, and by examining factors that are associated with gender gaps. There is a large body of literature on consumer payment choice. This literature shows that payment behaviour depends on a wide range of factors. First, the type of spending – what, where and how much you pay – is a relevant factor. For instance, the use of electronic payment instruments is positively related to the transaction amount (Wang and Wolman, 2016; Shy, 2023). Second, consumer payment choice depends on price incentives (Arango-Arango et al., 2018; Simon et al., 2010). Third, perceived attributes of

payment instruments matter, such as safety, ease of use and acceptance (Schuh and Stavins, 2010; van der Cruijssen and Plooij, 2018). Fourth, socio-psychological factors such as social norms (van der Cruijssen and Knobben, 2021) and habits (van der Cruijssen et al., 2017; van der Cruijssen and van der Horst, 2019) affect payment behaviour. Fifth, external shocks like the COVID-19 pandemic can change payment patterns (Chen et al., 2020; Jonker et al., 2022; Wisniewski et al., 2021). Finally, payment choice depends on personal characteristics, such as age and education (Bagnall et al., 2016; ECB, 2022) and people's financial constraints (Hernandez et al., 2017). See the recent, comprehensive literature review of Shy (2023) for more details and references. There is limited understanding of the gender gap in payment choice because, in many cases, gender is simply included as one of the individual-level characteristics in payment choice regressions.

We crafted a payment survey to research gender differences in the world of payments. This 2023 payment survey delves into various aspects, encompassing payment behaviour, preferences and experiences. It also explores perceptions regarding attributes of payment instruments, the division of households' payment tasks, as well as knowledge about, and encounters with, fraud in the world of payments. The survey was completed by members of the Centerpanel, a representative Dutch consumer panel that is extensively used by both researchers and policymakers. The Netherlands offers an excellent environment for investigating payment behaviour and fraud in the payment world. This is due to the widespread acceptance of both cash and electronic payments at point-of-sale (POS) locations (DNB, 2023), the nearly universal debit card and bank account ownership (ECB, 2022) and access to cash, as well as the high level of internet access at home (Statistics Netherlands, 2023). Consequently, we can focus on analysing consumer choices.

Foreshadowing our main results, we find that the world of payments is not free from gender gaps. For example, men are more likely to have adopted contactless payments with a smartphone or smartwatch, which are relatively new forms of digital payments. Differences in digital literacy and attitudes towards new payments instruments lie at the heart of these gender gaps, with women expressing lower digital literacy and less enjoyment when trying out new payment methods. Additionally, there is a clear division of tasks within the household when it comes to payments. On average, men are more involved in arranging housing-related payments, while women are more likely to take care of grocery payments and payments to family, friends, and acquaintances. Lastly, women tend to be less knowledgeable about payment fraud and express more fear of the digital payment world.

The rest of this paper is structured as follows. The next section describes the survey data and the Dutch payments landscape. Section 3 identifies the gender gaps in the world of payments. Section 4 contains the findings of models to investigate these gender gaps in greater detail. Lastly, section 5 draws conclusions and presents policy implications.

## 2. Data

### 2.1 Payment survey

We designed a survey to learn more about gender differences in the world of payments.<sup>1</sup> This payment survey covers payment behaviour, preferences and experiences, perceptions about payment instrument attributes, the division of tasks within the household when it comes to payments, and knowledge and experience with fraud. The survey was distributed among the Centerpanel, an online panel managed by Centerdata, a research institute affiliated with Tilburg University. Centerdata provides a simple computer, a broadband internet connection and technical assistance to people without facilities to participate in online surveys. The Centerpanel is representative of the Dutch population. Data collected among the Centerpanel has been used extensively by researchers and policymakers, for example to study the rose-tinted spectacles of homeowners (van der Crujisen et al., 2018) or financial literacy and wealth accumulation (van Rooij et al., 2012). For more information on the Centerpanel, we refer to Teppa and Vis (2012).

The survey was distributed among 3,186 members of the Centerpanel aged 16 years and older in the period from 24 November to 31 December 2023. The survey was fully completed by 2,617 respondents (82.1%) and partially by 23 panel members (0.7%). We use the answers of the group of respondents that fully completed the survey, which consists of 1,294 women and 1,323 men. This group is not fully representative for the Dutch population. Table A.1 in Appendix A compares the sample with the Dutch population. The share of men is only slightly higher in our sample compared to that in the Dutch population aged 16 and older. People with a high level of education, people with a high level of net household income and older people are over-sampled. Therefore, the results in this paper are based on weighted Centerpanel data to correct for differences between the sample and the population with respect to gender, age, net household income and the level of education.

### 2.2 The Dutch payments landscape

In 2022, Dutch consumers conducted approximately 6.6 billion POS transactions, amounting to a total value of €165 billion (DNB and DPA, 2023). Of these transactions, 20% were settled using cash. The majority of transactions were conducted through contactless payments with debit cards, constituting nearly half of all POS transactions (49%). Notably, the use of contactless payment methods via smartphones or wearables is on the rise in the Netherlands, accounting for 21% of all transactions. The remaining 10% of transactions were completed with debit cards in the traditional manner, involving the insertion of the card into the payment terminal. Over the past decade, the number of cash payments in the Netherlands has consistently declined, with the trend further accelerated by the impact of the COVID-19 pandemic (Jonker et al., 2022). Most Dutch retailers accept various payment methods, leading to high acceptance rates for both debit cards and cash at POS locations (DNB, 2020; DNB,

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<sup>1</sup> The payment survey is available upon request.

2023). Additionally, in the Netherlands, the proportion of consumers with access to a payment account (98%) and those possessing a payment card (95%) ranks among the highest in the euro area (ECB, 2022). Notably, nearly all payment cards in the country are equipped with Near Field Communication (NFC) chips, enabling seamless contactless payments. In 2023, internet access was prevalent among 98% of the Dutch population aged 12 years and older (Statistics Netherlands, 2023).

### **3. Gender gaps: descriptive results**

#### *3.1 Gender gaps in payment preferences, behaviour and experience*

We find no gender gaps in payment preferences at the checkout and payment instrument used at the checkout in the past month (Table 1, part A and B). Contactless payments by debit card are preferred and used the most. A total of 48.5% of Dutch people prefer paying contactless with their debit card and 50.6% use this way of paying most often. The next most popular option is paying contactless with a mobile phone, which is preferred and used most often by over 1 in 5 people. Substantially fewer people prefer cash or traditional debit card payments, which is reflected in payment behaviour. Only a small share of Dutch people prefer and mostly pay with their smartwatch. The credit card is at the bottom of both the payment preference and behaviour ranking.

In the Netherlands, a larger proportion of men than women have experience with paying contactless with a smartphone or smartwatch and with credit card payments (Table 1, part C). Among men 45.6% have experience paying contactless with a smartphone, 11.2% have paid contactless with a smartwatch, and 60.0% have used a credit card. Among women, these figures are 41.1%, 8.6% and 45.3%, respectively. Hence, the gap is the largest for experience with credit card payments. There are no gender gaps in payment experience for the other payment instruments. For both groups we find that more than 9 in 10 people have experience with contactless payments with a debit card. The same holds for traditional debit card payments, cash payments and iDeal payments, a popular online payment method in the Netherlands. When we explore differences in generations, we find that women between 16 and 34 years have just as much experience with digital payment methods as men in the same generation. This indicates that the gap may decrease over time.

Men enjoy trying out new payment methods more than women (Figure 1). For men, the agreement with the statement “I enjoy trying out new payment methods” is 3.7. For women the average is 3.3. Agreement is measured on a scale from 1 “completely disagree” to 7 “completely agree”. Digital literacy is also lower for women. On average, men self-assess their digital literacy to be 7.9 on a scale from 1 “not digitally skilled at all” to 10 “very digitally skilled”, while the average is 7.6 for women. People are digitally skilled if they possess all the skills necessary to navigate in the digital society. This includes the ability to use a computer or mobile phone proficiently and navigate the internet effectively.

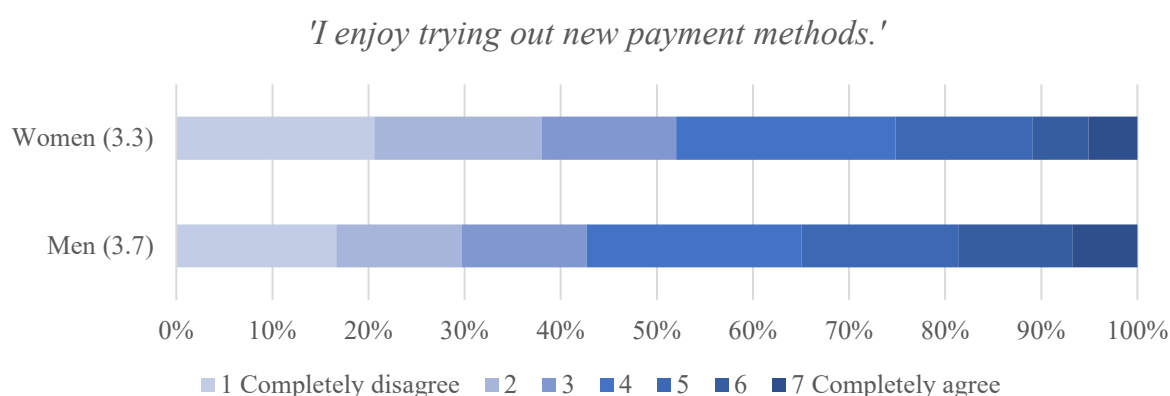
**Table 1. Summary statistics for payment preferences, behaviour and experience**

		(1)	(2)	(3)	(4)
		All	Women	Men	Gender gap
A) Payment preference at the checkout	Cash	13.2%	13.0%	13.5%	-0.5%
	Debit card: traditional	13.2%	12.2%	14.2%	-2.1%
	Contactless with a debit card	48.5%	50.2%	46.7%	3.4%
	Contactless with a mobile phone	22.3%	22.7%	22.0%	0.6%
	Contactless with a smartwatch	2.2%	1.7%	2.8%	-1.2%
	Credit card	0.3%	0.1%	0.4%	-0.3%
	Other	0.3%	0.2%	0.3%	-0.1%
B) Payment behaviour in the past month at the checkout	Cash	10.1%	10.4%	9.8%	0.6%
	Debit card: traditional	14.0%	13.1%	15.0%	-1.9%
	Contactless with a debit card	50.6%	51.1%	50.2%	0.9%
	Contactless with a mobile phone	22.7%	23.4%	22.0%	1.4%
	Contactless with a smartwatch	2.3%	1.9%	2.8%	-0.9%
	Credit card	0.1%	0.0%	0.1%	-0.1%
	Other	0.2%	0.2%	0.1%	0.1%
C) Payment experience	Cash	97.9%	98.0%	97.7%	0.3%
	Debit card: traditional	96.9%	96.9%	97.0%	-0.1%
	Contactless with a debit card	92.2%	92.9%	91.4%	1.5%
	Contactless with a mobile phone	43.5%	41.4%	45.6%	-4.1%*
	Contactless with a smartwatch	9.9%	8.6%	11.2%	-2.6*
	Credit card	52.6%	45.3%	60.0%	-14.6***
	iDeal	93.3%	93.1%	93.6%	-0.5%

Source: Payment Survey 2023.

Note: The table shows the weighted response shares for the total sample of 2,617 respondents (column 1), women (column 2), and men (column 3). Column 4 represents the difference between women and men. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

**Figure 1. Compared to men, women enjoy trying out new payment methods less**



Source: Payment Survey 2023.

Note: The figure shows the weighted response shares for 1,294 women and 1,323 men. Average scores are between parentheses.

### 3.2 Gender gaps in perceptions of payment instrument attributes

The best-performing payment method for each payment instrument attribute is the same for women and men. Table 2 shows relative perceptions of payment instrument attributes.<sup>2</sup> These perceptions matter for payment choice. For example, to calculate the relative perceived speed of cash, we took the absolute perception of the speed of cash minus the average absolute perceptions of the speed of the other payment instruments. On average, Dutch people perceive cash to be most helpful for money management, to offer the most privacy, and to be the most reliable (resistance to disruptions) payment instrument.

<sup>2</sup> See Table B.1 in Appendix B for the absolute perceptions of payment instrument attributes.



Contactless payments by debit card are perceived as the fastest and most convenient payment method, whereas traditional debit cards get the highest score for safety.

**Table 2. Summary statistics for relative perceived payment instrument attributes**

Payment instrument attribute		Relative perceptions			
		(1) All	(2) Women	(3) Men	(4) Gender gap
Speed (1 = very slow, ..., 7 = very fast)	Cash	-1.6	-1.6	-1.7	0.1
	Debit card: traditional	-0.2	-0.2	-0.1	-0.1
	Contactless with a debit card	1.3	1.2	1.3	-0.1***
	Contactless with a mobile phone	0.7	0.6	0.7	-0.04
	Contactless with a smartwatch	0.4	0.5	0.4	0.1
	Credit card	-0.6	-0.5	-0.7	0.1*
Safety (1 = very unsafe, ..., 7 = very safe)	Cash	0.3	0.4	0.3	0.2*
	Debit card: traditional	0.5	0.5	0.5	0.03
	Contactless with a debit card	0.2	0.1	0.2	-0.02*
	Contactless with a mobile phone	-0.4	-0.5	-0.3	-0.1***
	Contactless with a smartwatch	-0.6	-0.6	-0.5	-0.1*
	Credit card	-0.1	-0.03	-0.1	0.05
Convenience (1 = very inconvenient, ..., 7 = very convenient)	Cash	-1.2	-1.2	-1.2	-0.005
	Debit card: traditional	0.1	0.1	0.1	-0.1
	Contactless with a debit card	1.0	1.1	1.0	0.1
	Contactless with a mobile phone	0.3	0.4	0.3	0.03
	Contactless with a smartwatch	0.1	0.1	0.1	0.02
	Credit card	-0.4	-0.4	-0.4	-0.1
Contribute to money management (1 = very unhelpful, ..., 7 = very helpful)	Cash	2.1	2.1	2.0	0.1
	Debit card: traditional	0.2	0.3	0.1	0.1**
	Contactless with a debit card	-0.2	-0.2	-0.2	0.01
	Contactless with a mobile phone	-0.5	-0.6	-0.5	-0.1
	Contactless with a smartwatch	-0.7	-0.7	-0.7	-0.01
	Credit card	-0.9	-1.0	-0.8	-0.2***
Privacy (1 = very little privacy, ..., 7 = very much privacy)	Cash	1.4	1.4	1.5	-0.2
	Debit card: traditional	-0.2	-0.2	-0.2	-0.05
	Contactless with a debit card	0.05	0.1	0.02	0.1
	Contactless with a mobile phone	-0.4	-0.4	-0.4	0.04
	Contactless with a smartwatch	-0.5	-0.5	-0.5	0.04
	Credit card	-0.4	-0.4	-0.4	0.1
Reliability (1 = very unreliable, ..., 7 = very reliable)	Cash	2.0	2.1	1.9	0.3***
	Debit card: traditional	-0.05	-0.1	-0.03	-0.03
	Contactless with a debit card	-0.2	-0.2	-0.1	-0.1***
	Contactless with a mobile phone	-0.7	-0.7	-0.6	-0.1**
	Contactless with a smartwatch	-0.8	-0.8	-0.8	-0.02
	Credit card	-0.3	-0.3	-0.3	-0.02

Source: Payment Survey 2023.

Note: This table shows the average relative perceptions of payment instrument features for the total sample of 2,617 respondents (column 1), women (column 2), and men (column 3) based on weighted data. Column 4 represents the differences between women and men. The relative perception of a specific payment method attribute is equal to the perception of that attribute minus the average perception of that attribute for the other payment methods. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

A closer look at the relative perceptions of payment instrument attributes reveals some small gender differences. For instance, the relative perceived reliability of contactless payments with a debit card or mobile phone is lower for women than for men. Additionally, women have lower relative perceptions of the safety of contactless payments than men. Lastly, women have lower relative perceptions of the helpfulness of credit cards for money management than men, but higher relative perceptions of the speed of credit card payments.

### 3.3 Gender gaps in performing and arranging household payments

There are substantial gender gaps in performing and arranging household payments. Compared to men, women are more involved in grocery and person-to-person payments. For instance, 32.2% of women residing with their partners consistently handle grocery shopping payments, while this figure is only 11.8% for men in similar living arrangements. In handling payments to family, friends and acquaintances, 42.9% of women do so more often than their partner, while this holds for 30.2% of men. In contrast, men are more involved in arranging the following four types of household payments: rent or mortgage interest and repayment, insurances, taxes and social contributions, and subscriptions. For example, while 46.8% of men always take care of the payment of taxes and social contributions, this holds only for 23.1% of women. *Head of payments: overall* is the average of the six different head of household payment indicators, one for each category. A value of one indicates that the respondent takes care of all the household payments on their own, whereas a value of zero is given if the respondent is not involved in any of the household payments. On average, men are more involved in household payments than women; *head of payments: overall* is 0.62 for men and 0.54 for women (Table 3).<sup>3</sup> Cohabiting people between 16 and 34 years are more frequently jointly in charge of household payments than older generations (Figure 2).

**Table 3. Summary statistics for performing and arranging household payments**

	(1) All	(2) Women	(3) Men	(4) Gender gap
Head of payments: grocery shopping	0.56	0.68	0.46	0.22***
Head of payments: rent or mortgage interest and repayment	0.59	0.47	0.68	-0.21***
Head of payments: insurances	0.59	0.49	0.68	-0.19***
Head of payments: taxes and social contributions	0.60	0.49	0.70	-0.22***
Head of payments: subscriptions	0.58	0.51	0.64	-0.12***
Head of payments: payments to family, friends and acquaintances	0.58	0.61	0.55	0.07***
Head of payments: overall	0.58	0.54	0.62	-0.08***

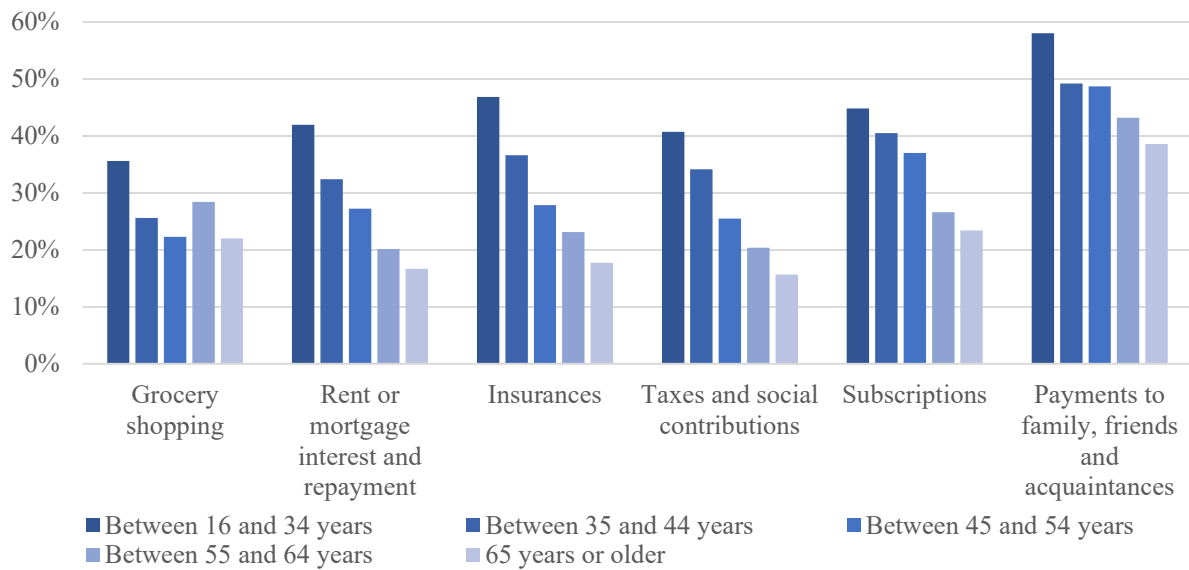
Source: Payment Survey 2023.

Note: This table shows which of the partners performs or arranges specific payments. For each payment category we constructed a head of payments variable, which is the average answer of respondents with 0 = “Someone else than my partner does this.” or “My partner always does this.”, 0.25 = “My partner does this more often than I do.”, 0.5 = “My partner and I do this equally often.”, 0.75 = “I do this more often than my partner.” and 1 = “I always do this.”. It thereby indicates who is in charge of the payments. *Head of payments: overall* is the average of the six different head of household payments indicators. The table shows the weighted head of payment indicators for the total sample of 1,761 respondents living with a partner (column 1), 805 women living with a partner (column 2), and 956 men living with a partner (column 3). Column 4 represents the difference between women and men. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

There is no gender gap in the frequency with which people check their partner’s household payments. Women answer on average 2.6 on a scale from 1 “never” to 6 “multiple times a day”, while men report a 2.7. This difference is not significant (p-value = 0.44). A total of 3 in 10 people who live together with a partner never check their partner’s household payments. We also asked what type of payment account respondents have. Among people living together with their partner, 62.4% have their own payment account and 84.9% have a joint payment account with their partner.

<sup>3</sup> Table B.2 in Appendix B shows the weighted response shares for the questions about performing and arranging household payments.

**Figure 2. Younger generation more frequently jointly in charge of household payments**  
*Share that equally often performs or arranges specific payments*



Source: Payment Survey 2023.

Note: The figure shows the weighted response shares for the total sample of 1,761 respondents living with a partner.

### 3.4 Gender gaps in fear of the world of payments

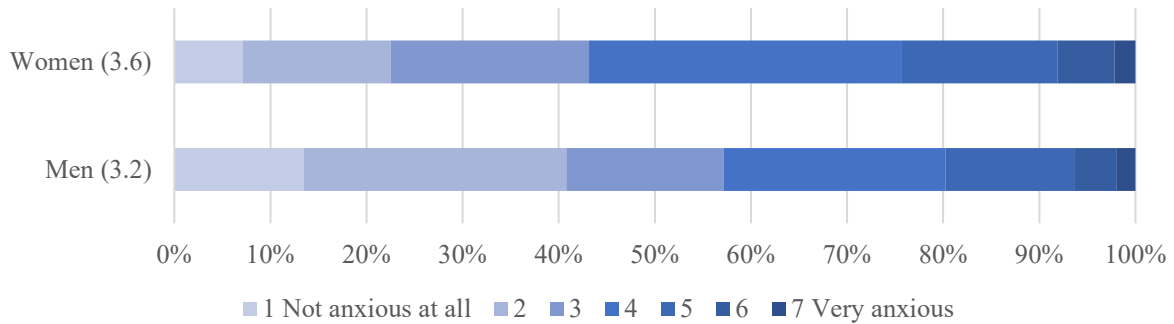
Women are more concerned about fraud, pickpocketing and theft of personal information than men. Concerns are the strongest with respect to theft of personal information for both men and women.

On average, women feel more anxious about the digital payment world than men (Figure 3). On a scale from 1 “Not anxious at all” to 7 “Very anxious” they report on average a 3.6, while this figure is 3.2 for men. About one in four women state that they are anxious, while this holds true for only one in five men. A fear gender gap is found across all generations.

The survey question about how anxious people feel in the digital payment world was followed by an open question to gain a deeper understanding of the reasons why people feel anxious. Figure 4a shows a word cloud capturing why women feel anxious, while Figure 4b provides this information for men. We find that there are many similarities between men and women on this subject. Cybercrime is the category that is named most often by both groups. This includes the fear of getting scammed or hacked. Moreover, respondents stated that digital payments are difficult in terms of control or overview, as they have limited insight into what is happening behind the mobile banking app and electronic transactions. The third most commonly stated reason was a lack of knowledge. Compared to women, men are generally more concerned about safety, reliability, not being able to have control or an overview in the digital payment world and privacy. Women are more likely to prefer offline banking, and state more often than men that they lack knowledge about the digital payment world.

**Figure 3. Compared to men, women feel more anxious about the digital payment world**

*'How anxious do you feel about the digital payment world?'*



Source: Payment Survey 2023.

Note: This figure shows weighted response shares for 1,294 women and 1,323 men. Average scores are between parentheses.

**Figure 4. Reasons for anxious feelings**

**a. Women**



**b. Men**



Source: Payment Survey 2023.

**3.5 Gender gaps in fraud knowledge**

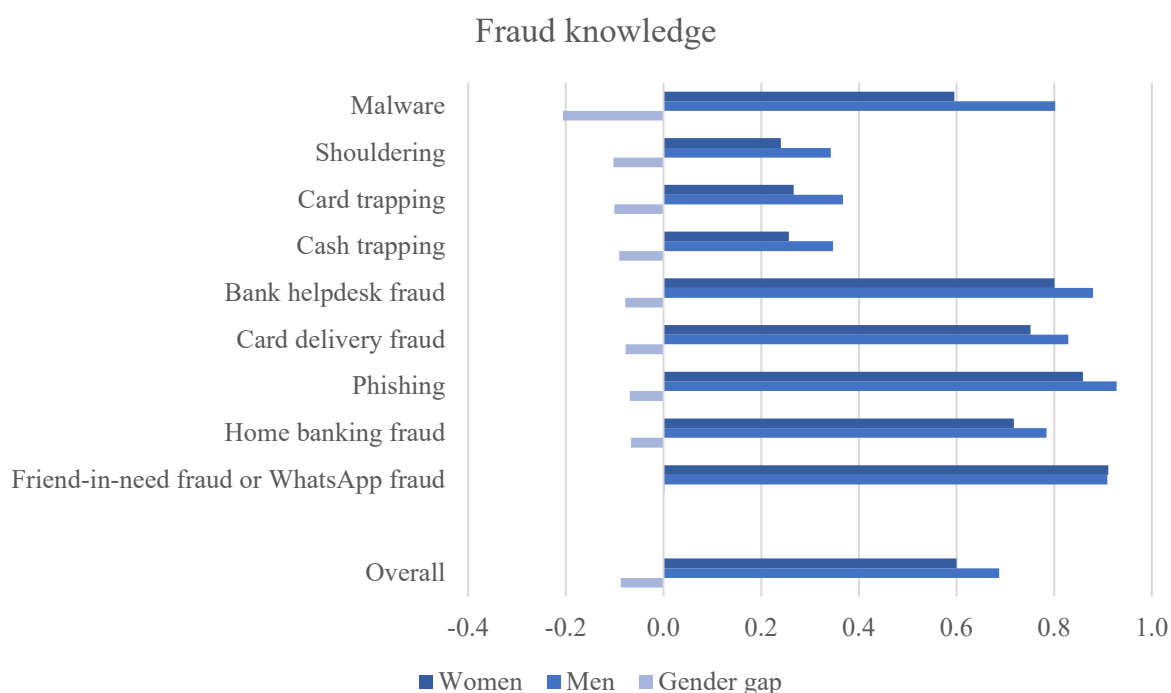
Our survey data provides insights into knowledge and experience with various forms of fraud. First, we measure knowledge. Table 4 shows the results. Respondents were asked whether they are familiar with

the following forms of fraud: (1) phishing, (2) bank helpdesk fraud, (3) card delivery fraud, (4) home banking fraud, (5) friend-in-need fraud or WhatsApp fraud, (6) shouldering, (7) cash trapping, (8) card trapping, and (9) malware. In phishing, criminals attempt to obtain confidential information such as bank details and personal information. This includes, for example, the PIN code for your bank card or your mobile banking code. Fraudsters may employ methods such as phone calls, emails, text messages, WhatsApp messages, and letters. In bank helpdesk fraud, criminals pretend to be a bank representative over the phone. They attempt to gain your trust to, for example, convince you to transfer money or hand over your bank card. In card delivery fraud, you are lured into giving away your payment card to someone or sending it by mail. In home banking fraud, the fake bank representative comes to your home to deceive you. In friend-in-need fraud/WhatsApp fraud, criminals pretend to be a close acquaintance or family member and ask you, in a WhatsApp message, to pay for something on their behalf or lend them money. You can also be deceived at the ATM. In shouldering, criminals watch over your shoulder to see your PIN code. In cash trapping, criminals place a cover over the ATM slot so that no money comes out when you attempt to withdraw cash. Once you leave, the criminals retrieve the money from the ATM. In card trapping, the card gets stuck in the ATM. Even if the screen prompts you to take out your card, your card does not come out. Malware is harmful or deceptive software that can enter insufficiently secured laptops, desktops, tablets and smartphones, for example, through hyperlinks, attachments, images in emails, WhatsApp messages and websites.

For each form of fraud respondents selected one of the following answers: “No, I have never heard of this.”, “Yes, I have heard of this, but I don’t know what it means.”, and “Yes, I know what this means.”. For each form of fraud we constructed a knowledge measure. Respondents receive a score of 0 if they have never heard of the particular form, a score of 0.5 if they have heard of it but do not know what it means, and a score of 1 if they know what it means. *Fraud knowledge: overall* is the average knowledge score, ranging between 0 (indicating no knowledge of any of the nine different forms of fraud) and 1 (indicating knowledge of the meaning of all nine different forms of fraud).

Compared to women, men have better knowledge about fraud (Table B.3 in Appendix B and Figure 5). For 8 out of 9 fraud types, their self-reported knowledge is significantly higher ( $p$ -value < 0.01) than for women. The gender gap is largest for knowledge about malware, namely -0.21. Whereas 71.6% of Dutch men know what malware is, only 46.6% of women know this. There is no gender gap in the case of friend-in-need fraud/WhatsApp fraud, and this is also the type of fraud for which knowledge is highest; 87.3% of Dutch people know what this type of fraud is and 7.4% have heard of it but do not know what it entails. Only 5.3% has never heard of this type of fraud. Fraud knowledge is lowest for shouldering: 24.7% of Dutch men know what it is compared to 16.4% of Dutch women. Overall, fraud knowledge is 0.60 for women and 0.69 for men, a significant gap of -0.09. A fraud knowledge gender gap is found across all generations.

**Figure 5. Women have less knowledge about fraud than men**



Source: Payment Survey 2023.

Note: The figure shows the weighted average knowledge scores for 1,294 women and 1,323 men for each type of fraud. A score of 0 is given if the respondent has never heard of the form of fraud, 0.5 if the respondent has heard of it, but does not know what it means and 1 if the respondent knows what it means. The overall knowledge score is the average of the nine fraud knowledge measures.

### 3.6 Gender gaps in fraud experience

Women express slightly lower levels of experience with fraud (Table 4). In the survey, the knowledge question was followed by experience questions. These questions consisted of an explanation of the particular type of fraud, a question about the respondent’s own experience with the type of fraud and whether they know people who have experienced it. Table B.4 in Appendix B shows the weighted response shares. For each type of fraud we constructed fraud experience measures. *Fraud experience self* is the experience with the different forms of fraud, where a score of 0 is given if the respondent has never experienced the form of fraud, 0.5 if the respondent has experienced it but did not fall for it and 1 if the respondent experienced the fraud and fell for it. *Fraud experience self: overall* is the average experience with five different types of fraud. A similar approach is applied to construct the fraud experience other people measures, that capture to what extent respondents know other people with fraud experience. People have the most experience – both themselves and via other people they know – with phishing and malware and least with being deceived at the ATM and with bank helpdesk fraud. Women have less experience with phishing and malware than men, both directly via own experiences and indirectly via experiences of others. For instance, 60.9% of women have never experienced phishing, while this figure is 54.0% for men. Women have also slightly less direct experience with bank helpdesk fraud than men. In contrast, women are more experienced when it comes to friend-in-need fraud, both

directly and via other people they know. Experience with ATM fraud does not significantly differ. Overall, the aggregate measures indicate that women have a bit less direct experience with fraud but similar levels of indirect fraud experiences. For all forms of payment fraud, only a small portion of the Dutch public has actually fallen victim. This is highest for malware: 4% of men and 3% of women report having been victims.

**Table 4. Summary statistics for experience with various forms of fraud**

	(1)	(2)	(3)	(4)
	All	Women	Men	Gender gap
Fraud experience self: phishing	0.22	0.21	0.24	-0.04***
Fraud experience other people: phishing	0.33	0.31	0.35	-0.05**
Fraud experience self: bank helpdesk fraud	0.05	0.05	0.06	-0.01*
Fraud experience other people: bank helpdesk fraud	0.15	0.15	0.16	-0.02
Fraud experience self: friend-in-need fraud or WhatsApp fraud	0.15	0.16	0.13	0.02**
Fraud experience other people: friend-in-need fraud or WhatsApp fraud	0.29	0.32	0.26	0.05***
Fraud experience self: deceived at the ATM	0.02	0.01	0.02	-0.003
Fraud experience other people: deceived at the ATM	0.06	0.06	0.07	-0.004
Fraud experience self: malware	0.21	0.19	0.23	-0.04***
Fraud experience other people: malware	0.25	0.22	0.28	-0.05***
Fraud experience self: overall	0.13	0.12	0.14	-0.01**
Fraud experience other people: overall	0.22	0.21	0.22	-0.01

Source: Payment Survey 2023.

Note: This table summarises experience with different forms of fraud. The table shows the weighted fraud experience measures for the total sample of 2,617 respondents (column 1), women (column 2), and men (column 3). Column 4 represents the difference between women and men. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively. The fraud experience self variables capture people's own experience with the different forms of fraud, where a score of 0 is given in case the respondent has never experienced the form of fraud, 0.5 if the respondent has experienced it but did not fall for it and 1 if the respondent experienced the fraud and fell for it. *Fraud experience self: overall* is the average of the five different types of fraud experience. A similar approach is applied to construct the fraud experience other people measures, that capture to what extent respondents know other people with fraud experience.

## 4. Gender gaps: empirical analysis

### 4.1 Payment experience

To investigate the gender gaps in payment experience in greater detail we estimate weighted logit models with various sets of explanatory variables. The dependent variables *experience: contactless with a mobile phone*, *experience: contactless with a smartwatch*, and *experience: credit card* are dummies with a value of one if the respondent has experience with the particular payment instrument, and zero otherwise. We have chosen these three payment instruments, because we found a gender gap in terms of experience (see Section 3.1). Columns 1a, 2a and 3a of Table 5 show the results of models with *female*, a dummy that takes on a value of one for female respondents and zero for males. Compared to men, women are 4 percentage points (pp) less likely to have experience paying contactless by phone, 3 pp less likely to have adopted contactless smartwatch payments, and 14 pp less likely to have ever used a credit card.

We include a wide range of factors in an attempt to explain these gaps. Columns 1b, 2b and 3b of Table 5 show the full models with all explanatory variables. First of all, these models include binary dummy variables capturing standard individual characteristics: the age of the respondent, whether the respondent has completed higher vocational and/or university education (*education: high*), the net monthly household income (four equal-sized groups of respondents), whether the respondent has a

partner, and whether the respondent owns a house. Second, the models include *works at a financial institution*, a dummy that takes on a value of one for respondents who work at a financial institution and zero otherwise. Third, self-assessed *digital literacy* is included. It is measured on a scale from 1 “not digitally skilled at all” to 10 “very digitally skilled. Fourth, *attitude new payment instruments* captures the enjoyment respondents experience when trying out new payment instruments. This variable ranges from 1 for respondents who completely agree with “I enjoy trying out new payment methods” to 7 for respondents who completely disagree with this statement. Finally, the models include relative payment instrument perceptions as defined in Section 3.2.

These factors explain the full gender gap for experience with contactless payments by mobile phone and smartwatch, while the credit card gender gap narrowed to -10 pp. The likelihood of having experience with these three payment instruments is significantly related to age, attitude towards new payment instruments and perceptions of safety. Experience with contactless payments by smartphone or smartwatch is relatively high among young people, whereas they are relatively unlikely to have ever used a credit card. The more people enjoy trying out new payment methods, the higher the likelihood that they have experience with these three types of payments. For example, someone who completely agrees with the statement “I enjoy trying out new payment methods” is 30 pp more likely to have experience paying contactless with a mobile phone than someone who completely disagrees with this statement. To illustrate the importance of safety perceptions, a one point higher relative safety perception of contactless payments with a mobile phone results in a 8 pp higher likelihood of having ever used this payment method.

There are also factors that are significantly positively related to only one or two payment methods. The likelihood of having experience with contactless payments with a mobile phone is also significantly related to income, having a partner, digital literacy and perceptions of speed, convenience and helpfulness with money management. For experience with contactless smartwatch payments, the additional significant factors are perceptions of speed and reliability. Finally, for the credit card, these are income, having a partner, digital literacy and perceptions of convenience and reliability. This shows that while there are some similarities between these payment instruments, different factors may influence whether people have experience in using them to pay at POS locations.

Appendix C shows the results of additional models in which each set of explanatory variables is included in separate models. The contactless payments gender gaps disappear when either *digital literacy*, *attitude new payment instruments* or the relative payment instrument characteristics are included (Table C.1 and C.2). For the credit card, we identified factors that narrow the gap but no factor that completely explains it (Table C.3).



**Table 5. Experience with contactless payments with a mobile phone, contactless payments with a smartwatch and credit card payments: explaining the gender gaps**

	<i>Experience: contactless with a mobile phone</i>		<i>Experience: contactless with a smartwatch</i>		<i>Experience: credit card</i>	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Female	-0.04*	-0.02	-0.03*	-0.02	-0.14***	-0.10***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
Age: between 35 and 44 years		-0.03		-0.01		0.15***
		(0.03)		(0.02)		(0.04)
Age: between 45 and 54 years		-0.08***		-0.02		0.21***
		(0.03)		(0.02)		(0.03)
Age: between 55 and 64 years		-0.16***		-0.11***		0.20***
		(0.03)		(0.03)		(0.03)
Age: 65 years or older		-0.27***		-0.12***		0.14***
		(0.03)		(0.03)		(0.03)
Education: high		-0.02		-0.04***		0.24***
		(0.02)		(0.02)		(0.02)
Income: EUR 2,199-3,270		0.05**		0.01		0.04
		(0.03)		(0.02)		(0.03)
Income: EUR 3,271-4,550		0.05*		0.03		0.07**
		(0.03)		(0.02)		(0.03)
Income: > EUR 4,550		0.03		0.03		0.11***
		(0.03)		(0.02)		(0.03)
Partner		0.04*		0.02		0.07***
		(0.02)		(0.02)		(0.02)
Homeowner		-0.02		-0.01		0.01
		(0.02)		(0.02)		(0.02)
Works at a financial institution		-0.02		0.02		0.08
		(0.04)		(0.03)		(0.06)
Digital literacy		0.03***		0.01		0.04***
		(0.01)		(0.01)		(0.01)
Attitude new payment instruments		0.05***		0.02***		0.02***
		(0.01)		(0.00)		(0.01)
Relative perceptions:						
Speed		0.06***		0.02**		0.01
		(0.01)		(0.01)		(0.01)
Safety		0.08***		0.03***		0.05***
		(0.01)		(0.01)		(0.01)
Convenience		0.04***		0.01		0.03***
		(0.01)		(0.01)		(0.01)
Helpfulness money management		0.03***		-0.00		0.01
		(0.01)		(0.01)		(0.01)
Privacy		-0.01		-0.00		-0.00
		(0.01)		(0.01)		(0.01)
Reliability		0.02		0.03***		0.04***
		(0.02)		(0.01)		(0.01)
Number of observations	2,617	2,617	2,617	2,617	2,617	2,617
Pseudo R-squared	0.00	0.36	0.00	0.21	0.02	0.20
Log pseudolikelihood	-1789.4	-1150.0	-842.1	-663.8	-1782.1	-1453.2
Chi-squared	3.0*	479.2***	2.8*	175.1***	37.8***	424.5***

*Note:* The table reports average marginal effects of weighted logit models with *experience: contactless with a mobile phone* as dependent variable in column 1a and 1b, *experience: contactless with a smartwatch* in column 2a and 2b and *experience: credit card* in column 3a and 3b. These variables are 1 for respondents who have experience with the payment instrument and 0 for respondents who have never used it. Robust standard errors are in parentheses. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

#### 4.2 Fraud knowledge

To research the gender gap in fraud knowledge we estimate weighted linear models with *fraud knowledge: overall* as dependent variable. The results are in Table 6. Column 1 shows the significant unconditional gender gap: -0.09. Once we add individual level characteristics (column 2), *works at a financial institution* (column 3) or fraud experience (column 6) this gap remains -0.09. The knowledge

gap is narrowed to -0.08 when we include either *digital literacy* (column 4) or *attitude new payment instruments* (column 5). Once we include all variables in one model, the knowledge gap is -0.07, which implies that these factors cannot fully explain the gender gap in fraud knowledge. Fraud knowledge is negatively related to being young and to homeownership (our proxy of wealth). Additionally, fraud knowledge is higher for people who work at a financial institution than for people who work elsewhere and is positively related to digital literacy and attitudes towards new payment instruments. Lastly, people with relatively high indirect fraud experience have a higher level of fraud knowledge than other people.

**Table 6. Fraud knowledge: explaining the gender gap**

	<i>Fraud knowledge: overall</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.09*** (0.011)	-0.09*** (0.011)	-0.09*** (0.011)	-0.08*** (0.011)	-0.08*** (0.011)	-0.09*** (0.011)	-0.07*** (0.011)
Age: between 35 and 44 years		0.06*** (0.020)					0.07*** (0.019)
Age between 45 and 54 years		0.09*** (0.018)					0.12*** (0.019)
Age: between 55 and 64 years		0.04** (0.019)					0.09*** (0.020)
Age: 65 years or older		0.01 (0.018)					0.08*** (0.020)
Education: high		0.04*** (0.011)					0.01 (0.011)
Income: EUR 2,199-3,270		0.02 (0.016)					0.01 (0.015)
Income: EUR 3,271-4,550		0.01 (0.017)					-0.01 (0.017)
Income: > EUR 4,550		0.04** (0.018)					0.03 (0.018)
Partner		0.02 (0.014)					0.02* (0.014)
Homeowner		-0.02 (0.014)					-0.02* (0.014)
Works at a financial institution			0.10*** (0.025)				0.07*** (0.025)
Digital literacy				0.04*** (0.004)			0.04*** (0.005)
Attitude new payment instruments					0.02*** (0.003)		0.01** (0.003)
Fraud experience self: overall						0.04 (0.060)	-0.02 (0.055)
Fraud experience other people: overall						0.14*** (0.035)	0.12*** (0.031)
Constant	0.69*** (0.008)	0.62*** (0.024)	0.68*** (0.008)	0.41*** (0.030)	0.63*** (0.014)	0.65*** (0.012)	0.27*** (0.045)
Number of observations	2,617	2,617	2,617	2,617	2,617	2,617	2,617
R-squared	0.03	0.07	0.04	0.10	0.05	0.05	0.15
F-statistic	59.5***	12.6***	38.9***	86.3***	44.5***	30.8***	17.3***

*Note:* The table reports coefficients of weighted linear models with *fraud knowledge: overall* as dependent variable. *Fraud knowledge: overall* is the average knowledge about nine different forms of fraud, where a score of 0 is given in case the respondent has never heard of the form of fraud, 0.5 if the respondent has heard of it, but does not know what it means and 1 if the respondent knows what it means. Robust standard errors are in parentheses. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

## **5. Concluding remarks and policy implications**

This paper has identified gender gaps in the world of payments. First, men have more experience with digital payment methods. Differences in digital literacy, attitudes towards new payments instruments and perceptions of payment instrument attributes lie at the heart of the observed differences in experiences with contactless payments by mobile phone and smartwatch, and can fully explain these gaps. The credit card experience gap is partly explained by these factors. Banks and payment services providers that want to encourage the use of contactless payments with a mobile phone or smartwatch among women could, for instance, do so by improving women's perceptions of the safety of these payment instruments and by working to enhance their enjoyment when trying out new payment instruments. Additionally, they could try to enhance women's digital literacy. Women lag behind in digital skills, which are necessary for navigating the digital payment world.

Second, our research shows differences in who pays for what with the household budget. For instance, men are more involved in taking care of the payment of housing-related costs and insurance, whereas women tend to be in charge of grocery payments and payments to family, friends and acquaintances. A division of tasks within the household comes at the risk of being unable to easily take over payment tasks in case of unexpected life events such as a divorce or death of a spouse. It is important that both partners have good insight in their household payments, and are thus aware of any potential financial issues. 3 in 10 individuals cohabitating with their partners neglect to review their partner's household payments.

Lastly, our research has found gender gaps in fraud knowledge and fear of the digital world of payments. Women have poorer fraud knowledge and express more fear of the digital world. Central banks and commercial banks want to combat all forms of payment fraud to improve the safety and reliability of the payment system and lower the financial losses caused by such fraud. They use information campaigns to raise public awareness of payment fraud because fraudsters are focusing increasingly on people as the weakest link in the system. Our research shows that there is ample of room to further improve fraud knowledge, especially among women.

There are various avenues for future research on gender gaps in the world of payments. For instance, it would be interesting to gain more insight into generational differences in gender gaps and how gender gaps evolve. Our research suggests that there are fewer gender gaps among the youngest generation. Further research in this area is needed. It would also be beneficial to understand the extent to which the allocation of payment responsibilities within a household is influenced by personal preferences or a lack of necessary skills. Furthermore, we encourage cross-country studies to learn more about cross-country differences in gender gaps in the world of payments and driving factors. Additionally, it would be helpful to gain a better understanding of what policy interventions can help to reduce gender gaps in the world of payments.

To conclude, every harmful gender gap is one too many, so we encourage efforts to narrow these gaps along with additional research on potential additional channels to do so.

## References

- Arango-Arango, C., Y. Bouhdaoui, D. Bounie, M. Eschelbach & L. Hernandez (2018). Cash remains top-of-wallet! International evidence from payment diaries. *Economic Modelling* 62, 38–48.
- Aristei, D. & M. Gallo (2022). Assessing gender gaps in financial knowledge and self-confidence: evidence from international data. *Finance Research Letters* 46, 102200.
- Bagnall, J., D. Bounie, K. Huynh, A. Kosse, T. Schmidt, S. Schuh & H. Stix (2016). Consumer cash usage: a cross-country comparison with payment diary survey data. *International Journal of Central Banking* 12 (4), 1–61.
- Blau, F.D. & L.M. Kahn (2017). The gender wage gap: extent, trends, and explanations. *Journal of Economic Literature* 55(3), 789–865.
- Broekhoff, M.C., C. van der Crujssen, N. Jonker, J. Reijerink, G. Umuhire & W. Vinken (2023). Digitalisation of the payment system: a solution for some, a challenge for others. DNB report, January. [https://www.dnb.nl/media/v5lgqudn/impact-digitalisering\\_en\\_web.pdf](https://www.dnb.nl/media/v5lgqudn/impact-digitalisering_en_web.pdf)
- Bucher-Koenen, T., A. Lusardi, R. Alessie & M. van Rooij (2017). How financially literate are women? An overview and new insights. *Journal of Consumer Affairs* 51(2), 255–283.
- Chen, S., S. Doerr, J. Frost, L. Gambacorta & H.S. Shin (2023). The fintech gender gap. *Journal of Financial Intermediation* 54, 101026.
- Chen, H., W. Engert, K.P. Huynh, G. Nicholls, M. Nicholson & J. Zhu (2020). Cash and COVID-19: the impact of the pandemic on the demand for and use of cash. Bank of Canada Staff discussion Paper 2020-6.
- De Nederlandsche Bank (2020). Who decides the way we pay – retailer or customer? December. <https://www.dnb.nl/en/general-news/dnbulletin-2020/who-decides-the-way-we-pay-retailer-or-customer/>
- De Nederlandsche Bank (2023). Some retail sectors refuse cash payments too often. February. <https://www.dnb.nl/en/general-news/dnbulletin-2023/some-retail-sectors-refuse-cash-payments-too-often/>
- De Nederlandsche Bank & the Dutch Payments Association (2023). Point-of-sale payments in 2022. DNB factsheet, April. <https://www.dnb.nl/media/m00mskgh/points-of-sale.pdf>
- Demirgüç-Kunt, A., L. Klapper & D. Singer (2017). Financial inclusion and inclusive growth: a review of recent empirical evidence. Policy Research Working Paper No. 8040. The World Bank.
- Demirgüç-Kunt, A., L. Klapper, D. Singer, & S. Ansar (2022). The global finindex database 2021: financial inclusion, digital payments, and resilience in the Age of COVID-19. World Bank Publications.
- ECB (2022). Study on the payment attitudes of consumers in the euro area 2022 (SPACE 2022). December.
- Hernandez, L., N. Jonker & A. Kosse (2017). Cash versus debit card: the role of budget control. *Journal of Consumer Affairs* 51(1), 91–112.

- Jonker, N., C. van der Crujisen, M. Bijlsma & W. Bolt (2022). Pandemic payment patterns. *Journal of Banking and Finance* 143, 106593.
- Ke, D. (2021). Who wears the pants? Gender identity norms and intrahousehold financial decision-making. *The Journal of Finance* 76(3), 1389–1425.
- Klapper, L. & D. Singer (2014). The opportunities of digitizing payments. Washington, DC: World Bank.
- Lind, T., A. Ahmed, K. Skagerlund, C. Strömbäck, D. Västfjäll, & G. Tinghög (2020). Competence, confidence, and gender: the role of objective and subjective financial knowledge in household finance. *Journal of Family and Economic Issues* 41, 626–638.
- Lusardi, A. & O.S. Mitchell (2007). Baby boomer retirement security: the roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics* 54(1), 205–24.
- Lusardi, A. & O.S. Mitchell (2008). Planning and financial literacy: how do women fare? *American Economic Review* 98(2), 413–17.
- Lusardi, A. & J.L. Streeter (2023). Financial literacy and financial well-being: evidence from the US. *Journal of Financial Literacy and Wellbeing* 1(2), 1–30.
- Schuh, S.D. & J. Stavins (2010). Why are (some) consumers (finally) writing fewer checks? The role of payment characteristics. *Journal of Banking and Finance* 34(8), 1745–1758.
- Shy, O. (2023). Cash is alive: how economists explain holding and use of cash. *Journal of Economic Literature* 61(4), 1465–1520.
- Simon, .J, K. Smith & T. West (2010). Price incentives and consumer payment behaviour. *Journal of Banking and Finance* 34, 1759–1772.
- Statistics Netherlands (2023). Internettoegang en internetactiviteiten; persoonskenmerken. October. <https://www.cbs.nl/nl-nl/cijfers/detail/84888NED>
- Teppa, F. & C. Vis (2012). The CentERpanel and the DNB Household Survey: methodological aspects. DNB Occasional Study No. 10(4). [https://www.dnb.nl/media/z33gbctk/201209\\_nr-4\\_-2012-the\\_centerpanel\\_and\\_the\\_dnb\\_household\\_survey\\_methodological\\_aspects.pdf](https://www.dnb.nl/media/z33gbctk/201209_nr-4_-2012-the_centerpanel_and_the_dnb_household_survey_methodological_aspects.pdf)
- Tok, Y.W. & D. Heng (2022). Fintech: financial inclusion or exclusion? IMF Working Paper No. WP/2022/080.
- van der Crujisen, C., L. Hernandez & N. Jonker (2017). In love with the debit card but still married to cash. *Applied Economics* 49(30), 2989–3004.
- van der Crujisen, C., D. Jansen & M. van Rooij (2018). The rose-tinted spectacles of homeowners, *Journal of Consumer Affairs* 52(1), 61–87.
- van der Crujisen, C. & J. Knoben (2021). Ctrl+C Ctrl+pay: do people mirror electronic payment behavior of their peers? *Journal of Financial Services Research* 59, 69–96.
- van der Crujisen, C. & M. Plooij (2018). Drivers of payment patterns at the point of sale: stable or not? *Contemporary Economic Policy* 36(2), 363–380.
- van der Crujisen, C. & F. van der Horst (2019). Cash or card? Unravelling the role of socio-psychological factors. *De Economist* 167(2), 145–175.

- van Rooij, M.C.J., A. Lusardi & R.J.M. Alessie (2011). Financial literacy and stock market participation. *Journal of Financial Economics* 101(2), 449–472.
- van Rooij, M.C.J., A. Lusardi & R.J.M. Alessie (2012). Financial literacy, retirement planning and household wealth. *The Economic Journal* 122(560), 449–478.
- Wang, Z. & A. Wolman (2016). Payment choice and currency use: insights from two billion retail transactions. *Journal of Monetary Economics* 84, 94–115.
- Wisniewski, T.P., M. Polasik, R. Kotkowski & A. Moro (2021). Switching from cash to cashless payments during the COVID-19 pandemic and beyond. NBP Working Paper No. 337.

## Appendix A. Representativeness of the sample

**Table A.1 Representativeness of the sample**

	Survey	Population
Men	50.6%	49.7%
Women	49.4%	50.3%
Age: 34 years and younger	11.5%***	29.1%
Age: between 35 and 44 years	13.5%*	14.5%
Age: between 45 and 54 years	16.9%**	15.7%
Age: between 55 and 64 years	19.3%***	16.4%
Age: 65 years or older	38.7%***	24.3%
Education: primary education, VMBO, MBO1, general secondary education lower years	26.6%***	28.9%
Education: MBO 2, 3, 4	21.8%***	26.2%
Education: HAVO, VWO	9.8%	10.1%
Education: HBO	26.3%***	21.1%
Education: WO	15.5%***	13.6%
Household net annual income: < 20.000 euro	13.7%	14.5%
Household net annual income: 20.000 to 30.000 euro	15.3%***	20.0%
Household net annual income: 30.000 to 40.000 euro	17.1%	16.2%
Household net annual income: 40.000 to 50.000 euro	16.3%***	12.2%
Household net annual income: ≥ 50.000 euro	37.6%	37.1%

*Source:* Population means are obtained from Statistics Netherlands (CBS) data for 2023.

*Notes:* We use CBS data on the population over age sixteen for gender. For education CBS data cover the population over age fifteen. For income, we use 2021 CBS data on disposable income covering the total population. \*\*\*, \*\* and \* denote statistical significance differences at the 0.01, 0.05 and 0.10 level between survey and population means.

## Appendix B. Additional summary statistics

**Table B.1. Summary statistics for perceived payment instrument attributes**

Payment instrument attribute		(1)	(2)	(3)	(4)
		All	Women	Men	Gender gap
Speed (1 = very slow, ..., 7 = very fast)	Cash	3.6	3.7	3.5	0.2**
	Debit card: traditional	4.8	4.8	4.8	0.1
	Contactless with a debit card	6.0	6.0	6.0	0.02
	Contactless with a mobile phone	5.5	5.5	5.4	0.1
	Contactless with a smartwatch	5.3	5.4	5.2	0.2**
	Credit card	4.4	4.5	4.3	0.2***
Safety (1 = very unsafe, ..., 7 = very safe)	Cash	5.3	5.4	5.3	0.1
	Debit card: traditional	5.5	5.5	5.5	-0.03
	Contactless with a debit card	5.2	5.1	5.2	-0.1
	Contactless with a mobile phone	4.7	4.6	4.8	-0.2**
	Contactless with a smartwatch	4.6	4.5	4.7	-0.1*
	Credit card	5.0	5.0	5.0	-0.01
Convenience (1 = very inconvenient, ..., 7 = very convenient)	Cash	4.2	4.2	4.2	-0.002
	Debit card: traditional	5.3	5.3	5.3	-0.05
	Contactless with a debit card	6.1	6.1	6.1	0.1
	Contactless with a mobile phone	5.5	5.5	5.5	0.03
	Contactless with a smartwatch	5.3	5.3	5.3	0.02
	Credit card	4.9	4.9	4.9	-0.04
Contribute to money management (1 = very unhelpful, ..., 7 = very helpful)	Cash	5.8	5.9	5.8	0.1
	Debit card: traditional	4.2	4.3	4.2	0.1
	Contactless with a debit card	3.9	3.9	3.9	-0.02
	Contactless with a mobile phone	3.6	3.6	3.7	-0.1
	Contactless with a smartwatch	3.5	3.5	3.5	-0.03
	Credit card	3.3	3.2	3.4	-0.2**
Privacy (1 = very little privacy, ..., 7 = very much privacy)	Cash	5.6	5.6	5.7	-0.1
	Debit card: traditional	4.3	4.3	4.3	0.02
	Contactless with a debit card	4.5	4.5	4.4	0.1
	Contactless with a mobile phone	4.1	4.1	4.0	0.1
	Contactless with a smartwatch	4.0	4.1	4.0	0.1
	Credit card	4.1	4.1	4.0	0.1
Reliability (1 = very unreliable, ..., 7 = very reliable)	Cash	6.3	6.3	6.3	0.0007
	Debit card: traditional	4.6	4.5	4.7	-0.2***
	Contactless with a debit card	4.5	4.3	4.6	-0.3***
	Contactless with a mobile phone	4.1	3.9	4.2	-0.3***
	Contactless with a smartwatch	4.0	3.9	4.1	-0.2***
	Credit card	4.4	4.2	4.5	-0.2***

Source: Payment Survey 2023.

Note: This table summarises perceptions of payment instrument attributes based on weighted data. The table shows the average absolute perceptions of payment instrument features for the total sample of 2,617 respondents (column 1), women (column 2), and men (column 3). Column 4 represents the differences between women and men. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.



**Table B.2. Summary statistics for performing and arranging household payments**

		(1)	(2)	(3)
		All	Women	Men
Grocery shopping	I always do this.	21.4%	32.3%	11.8%
	I do this more often than my partner.	21.8%	26.0%	18.0%
	My partner and I do this equally often.	26.9%	26.2%	27.4%
	My partner does this more often than I do.	19.9%	11.2%	27.6%
	My partner always does this.	6.7%	3.8%	14.8%
	Someone other than my partner or I does this.	0.4%	0.5%	0.3%
Rent or mortgage interest and repayment	I always do this.	37.8%	24.9%	49.0%
	I do this more often than my partner.	7.0%	7.1%	7.0%
	My partner and I do this equally often.	27.6%	28.9%	26.4%
	My partner does this more often than I do.	7.1%	10.6%	4.1%
	My partner always does this.	19.0%	27.0%	12.0%
	Someone other than my partner or I does this.	1.5%	1.5%	1.6%
Insurance	I always do this.	34.1%	23.2%	43.6%
	I do this more often than my partner.	10.1%	8.0%	12.0%
	My partner and I do this equally often.	30.3%	33.4%	27.5%
	My partner does this more often than I do.	10.2%	13.3%	7.5%
	My partner always does this.	14.3%	21.4%	8.1%
	Someone other than my partner or I does this.	1.0%	0.7%	1.2%
Taxes and social contributions (e.g., to the municipality)	I always do this.	35.8%	23.1%	46.8%
	I do this more often than my partner.	11.6%	9.2%	13.6%
	My partner and I do this equally often.	27.0%	30.4%	24.1%
	My partner does this more often than I do.	9.1%	13.2%	5.6%
	My partner always does this.	15.7%	23.2%	9.1%
	Someone other than my partner or I does this.	0.8%	0.9%	0.8%
Subscriptions (e.g., phone/internet, magazines, sports club, TV streaming)	I always do this.	27.3%	20.4%	33.2%
	I do this more often than my partner.	14.3%	11.2%	17.0%
	My partner and I do this equally often.	34.1%	37.8%	30.9%
	My partner does this more often than I do.	11.9%	14.7%	9.5%
	My partner always does this.	11.7%	15.2%	8.6%
	Someone other than my partner or I does this.	0.8%	0.8%	0.8%
Payments to family, friends, and acquaintances	I always do this.	17.3%	19.4%	15.5%
	I do this more often than my partner.	18.8%	23.5%	14.7%
	My partner and I do this equally often.	47.4%	44.9%	49.6%
	My partner does this more often than I do.	9.8%	6.4%	12.8%
	My partner always does this.	5.5%	4.9%	6.1%
	Someone other than my partner or I does this.	1.1%	1.0%	1.3%

Source: Payment Survey 2023.

Note: This table depicts which of the partners performs or arranges specific payments. The table shows the weighted response shares for the total sample of 1,761 respondents living with a partner (column 1), 805 women living with a partner (column 2), and 956 men living with a partner (column 3).

**Table B.3. Summary statistics for knowledge about various forms of fraud**

Forms of fraud		(1)	(2)	(3)	(4)
		All	Women	Men	Gender gap
Phishing	No, I have never heard of this.	4.2%	5.6%	2.7%	
	Yes, I have heard of this, but I don't know what it means.	13.0%	16.9%	9.0%	
	Yes, I know what this means.	82.8%	77.5%	88.3%	
	Fraud knowledge: phishing	0.89	0.86	0.93	-0.07***
Bank helpdesk fraud	No, I have never heard of this.	8.0%	10.8%	5.2%	
	Yes, I have heard of this, but I don't know what it means.	16.0%	18.2%	13.8%	
	Yes, I know what this means.	76.0%	71.0%	81.0%	
	Fraud knowledge: bank helpdesk fraud	0.84	0.80	0.88	-0.08***
Card delivery fraud	No, I have never heard of this.	14.5%	18.5%	10.5%	
	Yes, I have heard of this, but I don't know what it means.	13.0%	12.8%	13.2%	
	Yes, I know what this means.	72.5%	68.7%	76.3%	
	Fraud knowledge: card delivery fraud	0.79	0.75	0.83	-0.08***
Home banking fraud	No, I have never heard of this.	16.9%	20.0%	13.7%	
	Yes, I have heard of this, but I don't know what it means.	16.1%	16.4%	15.8%	
	Yes, I know what this means.	67.0%	63.6%	70.5%	
	Fraud knowledge: home banking fraud	0.75	0.72	0.78	-0.07***
Friend-in-need fraud or WhatsApp fraud	No, I have never heard of this.	5.3%	5.4%	5.2%	
	Yes, I have heard of this, but I don't know what it means.	7.4%	6.9%	7.8%	
	Yes, I know what this means.	87.3%	87.6%	86.9%	
	Fraud knowledge: friend-in-need fraud	0.91	0.91	0.91	0.002
Shouldering	No, I have never heard of this.	62.3%	68.4%	56.1%	
	Yes, I have heard of this, but I don't know what it means.	17.2%	15.2%	19.2%	
	Yes, I know what this means.	20.5%	16.4%	24.7%	
	Fraud knowledge: shouldering	0.29	0.24	0.34	-0.10***
Cash trapping	No, I have never heard of this.	60.6%	66.3%	54.9%	
	Yes, I have heard of this, but I don't know what it means.	18.4%	16.1%	19.2%	
	Yes, I know what this means.	21.0%	17.6%	24.7%	
	Fraud knowledge: cash trapping	0.30	0.26	0.35	-0.09***
Card trapping	No, I have never heard of this.	58.0%	63.7%	52.3%	
	Yes, I have heard of this, but I don't know what it means.	20.6%	19.3%	22.0%	
	Yes, I know what this means.	21.3%	17.0%	25.8%	
	Fraud knowledge: card trapping	0.32	0.27	0.37	-0.10***
Malware	No, I have never heard of this.	19.4%	27.5%	11.3%	
	Yes, I have heard of this, but I don't know what it means.	21.5%	25.9%	17.1%	
	Yes, I know what this means.	59.0%	46.6%	71.6%	
	Fraud knowledge: malware	0.70	0.60	0.80	-0.21***
Fraud knowledge: overall	0 = respondent has never heard about any of the nine different forms of fraud, 1 = respondent knows what each form of fraud means	0.64	0.60	0.69	-0.09***

Source: Payment Survey 2023.

Note: This table summarises self-reported knowledge about different forms of fraud. The table shows the weighted response shares and fraud knowledge measures for the total sample of 2,617 respondents (column 1), women (column 2), and men (column 3). Column 4 represents the fraud knowledge difference between women and men. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively. *Fraud knowledge: overall* is the average knowledge about the different forms of fraud, where a score of 0 is given in case the respondent has never heard of the form of fraud, 0.5 if the respondent has heard of it, but does not know what it means and 1 if the respondent knows what it means.

**Table B.4. Summary statistics for experience with various forms of fraud**

Forms of fraud			(1)	(2)	(3)
			All	Women	Men
Phishing	Self	I have never experienced this.	57.5%	60.9%	54.0%
		I have experienced this but did not fall for it.	40.2%	36.9%	43.5%
		I have experienced this and fell for it.	2.3%	2.2%	2.5%
	Other people	I don't know someone who has experienced this.	50.8%	53.2%	48.3%
		I know someone who has experienced this but did not fall for it.	32.4%	31.6%	33.2%
		I know someone who has experienced this and fell for it.	16.9%	15.3%	18.5%
Bank helpdesk fraud	Self	I have never experienced this.	90.6%	91.6%	89.7%
		I have experienced this but did not fall for it.	8.4%	7.8%	8.9%
		I have experienced this and fell for it.	1.0%	0.7%	1.4%
	Other people	I don't know someone who has experienced this.	77.0%	77.3%	76.7%
		I know someone who has experienced this but did not fall for it.	15.1%	14.6%	15.6%
		I know someone who has experienced this and fell for it.	7.9%	8.0%	7.8%
Friend-in-need fraud or WhatsApp fraud	Self	I have never experienced this.	71.6%	69.3%	73.8%
		I have experienced this but did not fall for it.	27.7%	29.9%	25.5%
		I have experienced this and fell for it.	0.7%	0.8%	0.7%
	Other people	I don't know someone who has experienced this.	50.6%	46.4%	54.8%
		I know someone who has experienced this but did not fall for it.	40.8%	44.2%	37.4%
		I know someone who has experienced this and fell for it.	8.6%	9.5%	7.8%
Deceived at the ATM	Self	I have never experienced this.	97.5%	97.8%	97%
		I have experienced this but did not fall for it.	27.7%	1.5%	2.3%
		I have experienced this and fell for it.	0.7%	0.7%	0.6%
	Other people	I don't know someone who has experienced this.	91.6%	92.0%	91.2%
		I know someone who has experienced this but did not fall for it.	4.2%	3.9%	4.4%
		I know someone who has experienced this and fell for it.	4.2%	4.1%	4.4%
Malware	Self	I have never experienced this.	61.9%	65.8%	58.0%
		I have experienced this but did not fall for it.	34.3%	31.0%	37.6%
		I have experienced this and fell for it.	3.8%	3.2%	4.4%
	Other people	I don't know someone who has experienced this.	61.5%	64.5%	58.3%
		I know someone who has experienced this but did not fall for it.	26.8%	26.1%	27.5%
		I know someone who has experienced this and fell for it.	11.8%	9.4%	14.2%

Source: Payment Survey 2023.

Note: This table summarises experience with different forms of fraud. The table shows the weighted response shares for the total sample of 2,617 respondents (column 1), women (column 2), and men (column 3).

## Appendix C. Additional regression results

**Table C.1. Contactless payments with a mobile phone: explaining the gender gap**

	<i>Experience: contactless with a mobile phone</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.04*	-0.07***	-0.04*	-0.01	0.00	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Age: between 35 and 44 years		-0.07*					-0.03
		(0.04)					(0.03)
Age: between 45 and 54 years		-0.16***					-0.08***
		(0.03)					(0.03)
Age: between 55 and 64 years		-0.28***					-0.16***
		(0.03)					(0.03)
Age: 65 years or older		-0.41***					-0.27***
		(0.03)					(0.03)
Education: high		0.02					-0.02
		(0.02)					(0.02)
Income: EUR 2,199-3,270		0.09***					0.05**
		(0.03)					(0.03)
Income: EUR 3,271-4,550		0.12***					0.05*
		(0.03)					(0.03)
Income: > EUR 4,550		0.12***					0.03
		(0.04)					(0.03)
Partner		0.02					0.04*
		(0.03)					(0.02)
Homeowner		-0.02					-0.02
		(0.03)					(0.02)
Works at a financial institution			0.11*				-0.02
			(0.06)				(0.04)
Digital literacy				0.11***			0.03***
				(0.01)			(0.01)
Attitude new payment instruments					0.10***		0.05***
					(0.01)		(0.01)
Relative perceptions:							
Speed						0.10***	0.06***
						(0.01)	(0.01)
Safety						0.10***	0.08***
						(0.01)	(0.01)
Convenience						0.07***	0.04***
						(0.01)	(0.01)
Helpfulness money management						0.04***	0.03***
						(0.01)	(0.01)
Privacy						-0.03**	-0.01
						(0.01)	(0.01)
Reliability						0.02	0.02
						(0.02)	(0.02)
Number of observations	2,617	2,617	2,617	2,617	2,617	2,617	2,617
Pseudo R-squared	0.00	0.11	0.00	0.09	0.11	0.24	0.36
Log pseudolikelihood	-1789.4	-1594.7	-1787.2	-1637.0	-1596.1	-1370.4	-1150.0
Chi-squared	3.0*	290.9***	6.4**	129.9***	204.0***	274.1***	479.2***

*Note:* The table reports average marginal effects of weighted logit models with *experience: contactless with a mobile phone* as dependent variable. This variable is 1 for respondents who have experience paying contactless with a mobile phone and 0 for respondents who have never paid contactless with a mobile phone. Robust standard errors are in parentheses. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

**Table C.2. Contactless payments with a smartwatch: explaining the gender gap**

	<i>Experience: contactless with a smartwatch</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.03*	-0.04**	-0.03*	-0.02	-0.01	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Age: between 35 and 44 years		-0.01					-0.01
		(0.02)					(0.02)
Age: between 45 and 54 years		-0.04*					-0.02
		(0.02)					(0.02)
Age: between 55 and 64 years		-0.14***					-0.11***
		(0.03)					(0.03)
Age: 65 years or older		-0.17***					-0.12***
		(0.03)					(0.03)
Education: high		-0.03*					-0.04***
		(0.02)					(0.02)
Income: EUR 2,199-3,270		0.03					0.01
		(0.02)					(0.02)
Income: EUR 3,271-4,550		0.05**					0.03
		(0.03)					(0.02)
Income: > EUR 4,550		0.05*					0.03
		(0.03)					(0.02)
Partner		0.02					0.02
		(0.02)					(0.02)
Homeowner		-0.00					-0.01
		(0.02)					(0.02)
Works at a financial institution			0.05				0.02
			(0.03)				(0.03)
Digital literacy				0.04***			0.01
				(0.01)			(0.01)
Attitude new payment instruments					0.03***		0.02***
					(0.00)		(0.00)
Relative perceptions:							
Speed						0.03***	0.02**
						(0.01)	(0.01)
Safety						0.03***	0.03***
						(0.01)	(0.01)
Convenience						0.01	0.01
						(0.01)	(0.01)
Helpfulness money management						0.00	-0.00
						(0.01)	(0.01)
Privacy						-0.01	-0.00
						(0.01)	(0.01)
Reliability						0.03***	0.03***
						(0.01)	(0.01)
Number of observations	2,617	2,617	2,617	2,617	2,617	2,617	2,617
Pseudo R-squared	0.00	0.08	0.01	0.05	0.07	0.13	0.21
Log pseudolikelihood	-842.1	-773.8	-840.2	-800.6	-788.5	-738.5	-663.8
Chi-squared	2.8*	96.7***	4.8***	35.3***	46.2***	87.2***	175.1***

*Note:* The table reports average marginal effects of weighted logit models with *experience: contactless with a smartwatch* as dependent variable. This variable is 1 for respondents who have experience paying contactless with a smartwatch and 0 for respondents who have never paid contactless with a smartwatch. Robust standard errors are in parentheses. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

**Table C.3. Payments with a credit card: explaining the gender gap**

	<i>Experience: credit card</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.14*** (0.02)	-0.12*** (0.02)	-0.14*** (0.02)	-0.13*** (0.02)	-0.13*** (0.02)	-0.15*** (0.02)	-0.10*** (0.02)
Age: between 35 and 44 years		0.15*** (0.04)					0.15*** (0.04)
Age: between 45 and 54 years		0.18*** (0.04)					0.21*** (0.03)
Age: between 55 and 64 years		0.15*** (0.03)					0.20*** (0.03)
Age: 65 years or older		0.07** (0.03)					0.14*** (0.03)
Education: high		0.26*** (0.02)					0.24*** (0.02)
Income: EUR 2,199-3,270		0.06** (0.03)					0.04 (0.03)
Income: EUR 3,271-4,550		0.11*** (0.03)					0.07** (0.03)
Income: > EUR 4,550		0.16*** (0.04)					0.11*** (0.03)
Partner		0.06** (0.03)					0.07*** (0.02)
Homeowner		0.03 (0.03)					0.01 (0.02)
Works at a financial institution			0.22*** (0.07)				0.08 (0.06)
Digital literacy				0.06*** (0.01)			0.04*** (0.01)
Attitude new payment instruments					0.04*** (0.01)		0.02*** (0.01)
Relative perceptions:							
Speed						0.00 (0.01)	0.01 (0.01)
Safety						0.06*** (0.01)	0.05*** (0.01)
Convenience						0.04*** (0.01)	0.03*** (0.01)
Helpfulness money management						-0.01 (0.01)	0.01 (0.01)
Privacy						-0.01 (0.01)	-0.00 (0.01)
Reliability						0.07*** (0.01)	0.04*** (0.01)
Number of observations	2,617	2,617	2,617	2,617	2,617	2,617	2,617
Pseudo R-squared	0.02	0.12	0.02	0.04	0.03	0.07	0.20
Log pseudolikelihood	-1782.1	-1599.2	-1773.4	-1731.1	-1749.5	-1675.1	-1453.2
Chi-squared	37.8***	269.4***	48.6***	91.2***	77.4***	164.0***	424.5***

*Note:* The table reports average marginal effects of weighted logit models with *experience: credit card* as dependent variable. This variable is 1 for respondents who have experience with the credit card and 0 for respondents who have never used the credit card. Robust standard errors are in parentheses. \*\*\*, \*\* and \* denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

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